Distance Learning for Health: What works

A global review of accredited post-qualification training programmes for health workers in low and middle income countries

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical and Research Foundation
CBE	Community Based Education
CEDH	Centre for Educational Development in Health
Ch.B	Bachelor of Surgery
CMC Vellore	Christian Medical College, Vellore
COM	College of Medicine
DDS	Doctor of Dental Surgery
DL4H	Distance Learning for Health
DSc	Doctor of Science
ERIC	Educational Research Information Clearinghouse
FAIMER	Foundation for Advancement of International Medical Education and Research
FCS	Fellow of the College of Surgeons
GHWA	Global Health Workforce Alliance
GWU	George Washington University (USA)
HIV	Human Immunodeficiency Virus
HRH	Human Resources for Health
IGNOU	Indira Gandhi National Open University IIME Institute for International Medical Education
IT/ICT	Information Technology/Information Communications Technology
KCL	Kings College London
LMICs	Low- and middle-income countries
LSHTM	London School of Hygiene and Tropical Medicine
MA	Master of Arts
MB	Medicinae Baccalaureus (Bachelor of Medicine)
MBBS	Bachelor of Medicine and Bachelor of Surgery
MBChB	Bachelor of Medicine, Bachelor of Surgery
MD	Medical Doctor
MDG	Millennium Development Goal
Mdent	Master in Dentistry
MMed	Master in Medicine
MOE	Ministry of Education
MOH	Ministry of Health
MPH	Masters in Public Health
MSc	Master of Science
MSH	Management Sciences for Health
NCDE	National Centre for Distance Education, Tanzania
NEPAD	New Partnership for Africa's Development
NGO	Non Governmental Organisation
NRHM	National Rural Health Mission
NPC	Non-Physician Clinician
Ob/GYN	Obstetrics and Gynaecology
ODL	Open and Distance Learning
OSCE	Observed-Structured Clinical Exam
OUM	Open University of Malaysia
OU SL	Open University of Sri Lanka
OU UK	Open University UK
PBL	Problem Based Learning
PGME	Post Graduate Medical Education
PHC	Primary Health Care
PhD	Doctor of Philosophy
PHRN	Public Health Resource Network, India
RN	Registered Nurse
RSC	Research Support Centre
SADC	Southern African Development Community
SAHCD	Southern Africa Human Capacity Development
SAMSS	Sub-Saharan African Medical School Study
SSA	Sub-Saharan Africa
SWAp	Sector Wide Approach
UCL	University College London
UiTM	University of Technolgi Mara, Malaysia
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNISA	University of South Africa
UoI	University of Ibadan, Nigeria
US	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
UWC	University of Western Cape
UWI	University of West Indies
VLE	Virtual Learning Environment
WebCT	Web-based Course Tools
WHO	World Health Organisation

Executive Summary

Findings at a glance:

- The World Health Organisation and the Millennium Development Goals Commission have identified a crisis-level shortage of health workers internationally.

- The Global Health Workforce Alliance (GHWA) argue that training can address this crisis, but only as part of an integrated approach to tackling health system deficiencies, through:
  - increasing the number of health workers;
  - strengthening the capacity of the system for better service delivery.

- Distance learning is one of the possible modes of training delivery, either as a stand-alone or as part of blended learning, with a range of benefits, such as:
  - increased access to training for health workers;
  - training compatible with on-going provision of community health care.

- Most training programmes for health workers combine face-to-face, distance learning and blended modes, and also employ elements of self-study and work-based learning.

- Most distance learning programmes for health workers make use of ICTs in combination with traditional media, but there are severe technological constraints in low-resource contexts.

- Planning distance learning programmes for health workers in low and middle income countries must take into account existing infrastructure and needs of learners, and must seek integration with the health system at large.

- There is a need for a more systematic approach to evaluating the impact of DL4H on health workers' performance and health outcomes.

Introduction – background and aims of the study

Healthcare systems in many low and middle income countries have been assessed to be weakly placed to pursue healthcare goals, including the health-related Millennium Development Goals (MDGs), in great part due to what has been described as a health workforce 'crisis'[i]. Constraints such as shortages of health workers, weak management and technical knowledge, and inadequate supervision have been repeatedly cited in the literature as barriers to capacity for health service provision[ii].

Fifty-seven countries, 36 of which are in sub-Saharan Africa, do not have sufficient numbers of health workers to support the provision of basic health services such as skilled attendance at birth and immunisations[iii]. World Health Organisation (WHO) calls it a crisis situation when in a given country the average ratio of doctors, nurses and midwives falls below 2.5 per 1,000 population. Such shortages translate into an immediate need for an additional 3.5 million health workers by 2015[iv].

One of the major challenges in addressing this shortage is the need to train and educate large numbers of health workers, in particular community workers in low and middle income countries[v]. In order to address this challenge, there is a real need to develop and evaluate new and innovative ways of training.

Distance learning for health (DL4H) is gaining popularity as a means of providing education and training to health professionals in low and middle income countries. This growth in popularity stems from the potential advantages conferred by distance learning, including: greater and easier access, low cost, scope for capacity strengthening and the potential for 'in career' training that can indirectly contribute to better retention of the workforce.

Despite this growth in the use of distance learning, there has been little formal research analysing it as a mode of delivering training to health workers in low and middle income countries. It was with this in mind and in support of the UK government's programme of work on human resources for health that the Department of Health commissioned the London International Development Centre (LIDC) to review and analyse current DL4H programmes used for training of health workers in low and middle income countries.

This document summarises findings of a global review whose aim was to identify patterns of success and impact, and outline likely trends in the nature and provision of distance learning for health in low and middle income countries, hence informing future policy, research and investment in DL4H.

The review focuses on distance learning designed for or accessible by the medical workforce based in low and middle income countries. It focuses on accredited distance learning health training programmes designed to assist in developing the competencies of practising health workers or those with a basic qualification enabling them to practice as health professionals. Only programmes provided in English, or where documentation is available in English, were included.

The review involved a global survey of current provision in distance learning for health workers, followed by a consultation with relevant provider institutions and individuals both in the UK and internationally. The findings were further explored at the DL4H International Workshop held in October 2010 and the conference proceedings fed into the final report.

The review has succeeded in undertaking research in a previously under-investigated area, and so it makes the case for the potential value that distance learning may have in addressing current Human Resources for Health (HRH) priorities at the global level. It has gathered and analysed data on current practice in distance learning for health workers that was previously unavailable in the public sphere, and from this established a basis from which DL4H programmes might be analysed in the future. As such, the review contributes to the establishment of guidelines for policy-makers and practitioners. Finally, through the activities of the desk-review and the DL4H International Workshop, the review has contributed to the formation of a global network of DL4H

professionals, establishing a forum for contact between tertiary education institutions, NGOs, donors, funders and government agencies.

Addressing current health systems needs through health worker training

In approaching the strengthening of health systems, whether at the national or global level, it is important to regard health worker training as one intervention among several, best delivered in parallel with related inputs across a range of areas, including investments in service delivery mechanisms; HR management; health research and information gathering; new medicines and technologies; and sector-wide leadership and governance[vi]. Without such parallel investments contributing to the creation of a supportive working environment, programmes of training for health workers are unlikely to provide sustained improvements in health worker performance in the workplace (see Section 3.2. of the review).

Training can help address the challenges faced by health systems in two ways. Firstly, there is the need to significantly increase numbers of health workers in low and middle income countries through a scale-up of health training provision, with a particular emphasis on the training of community-based health workers.

Secondly, there is the need to strengthen the capacity of health systems to deliver services more effectively, and to provide greater levels of specialist care. This places a particular emphasis on training health workers at all levels to enhance their professional skills and competencies, both in terms of management and administration of health services, and in terms of developing clinical specialisms.

Training approaches for health worker performance enhancement

The basic modes of delivery for performance improvement in the post-qualification training of health workers include a significant number of components that, at some level, are based around learner engagement with the professional working environment. These include, for example, work-based learning; community-based learning; interactive and clinically integrated learning; interdisciplinary learning; applied simulated learning; and clinical supervision (see Section 4.4.). The WHO's Global Health Workforce Alliance (GHWA) sees a model for training where health workers in low and middle income countries are educated and trained at the national level by higher education institutions, in a regulated system that includes modules taught 'in the community as well as in the classroom'[vii]. Community-based education for health workers contributes towards ensuring that the mode of training and the skills acquired are better suited to the health needs of the population[viii]. The range of training modalities that are seen to assist with this include workplace-based learning, community-based learning, and distance learning that features applied study components.

Providing such training components relies on an enabling work environment, and if the requisite elements are not present in the work environment, then training programmes need to consider the means by which these elements might be developed. In addition, training programmes should endeavour to formally incorporate those elements into the teaching and learning process, including mechanisms for work-based learner support, peer-to-peer interaction, application of skills and so on.

Benefits of distance learning in health worker training

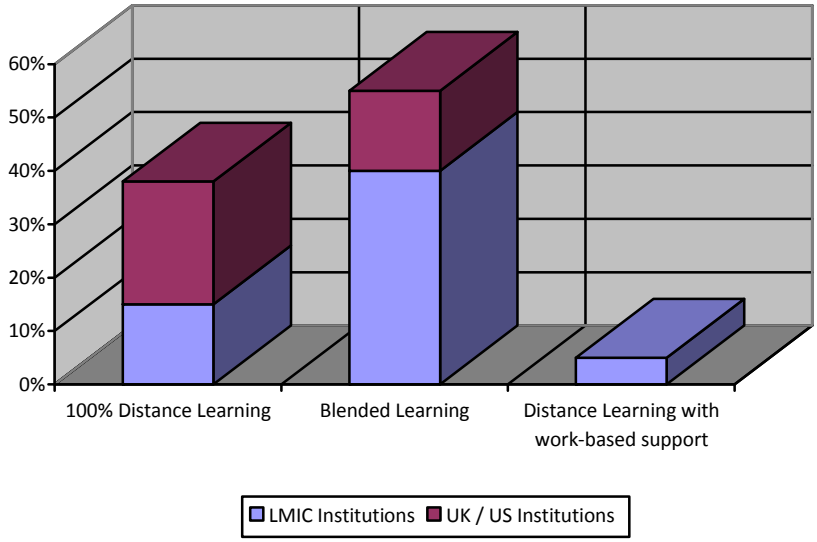
At a general level, as a mode of training delivery, distance learning can contribute to strengthening of health systems and improvements in health worker performance through its potential to:

- overcome various constraints associated with educational access and institutional capacity;
- facilitate guided academic study while learners continue to engage with their professional activities and working environment on a daily basis (see Section 5.2.1.).

These properties give distance learning the potential to contribute to health systems strengthening through two primary means. Firstly, through facilitating scales of training required to meet the necessary expansion of the health workforce in low and middle income countries. Secondly, in enabling training to take place in the daily working environment rather than on-campus, distance learning facilitates an applied mode of professional development that can respond directly to the requirements of health systems at the local level. Closely related to this second point, distance learning has the potential to contribute to individual improvements in health worker performance, because its primary characteristics of 'on-the-job' provision enable those applied and clinically-integrated learning approaches that are seen to benefit health workers in particular.

Distance learning programmes are also valuable as part of a 'blended learning' mode of delivery, where independent self-study is supplemented by traditional applied and clinically-integrated learning approaches based on face-to-face contact between learners, peers and mentors. This is illustrated by the range of programmes presented in the case studies for this review, where 27 out of 40 programmes feature some form of face-to-face contact, and a further 12 out of 13 operate under the principle that their learners are engaged as professional health workers at the time of study (see Section 7.3.1.).

Table i: Distribution of programmes according to basic delivery mode (N = 40)



At a general level, the case studies support the contention that it appears increasingly redundant to describe post-qualification programmes for health workers strictly in terms of 'distance', 'blended' or 'face-to-face' modes of delivery[ix], due to the ways in which these modes are being combined by institutional providers to enable increasingly flexible modes of study to suit the individual needs and circumstances of learners.

Further to this, and dependent on circumstances, the range of case studies shows there is both the potential for combining face-to-face or virtual contact and supervision with units of reflective self-study and work-based

practice (see Section 7.3.), and value is to be found in doing so (see Section 4.4.) With this in mind, it is less the programmes that can be analysed in terms of 'distance', 'blended' or 'face-to-face' delivery modes, and rather the range of teaching and learning components that make up each programme.

The proviso is that the range of teaching and learning components that a programme offers, regardless of the delivery mode, should provide learners with:

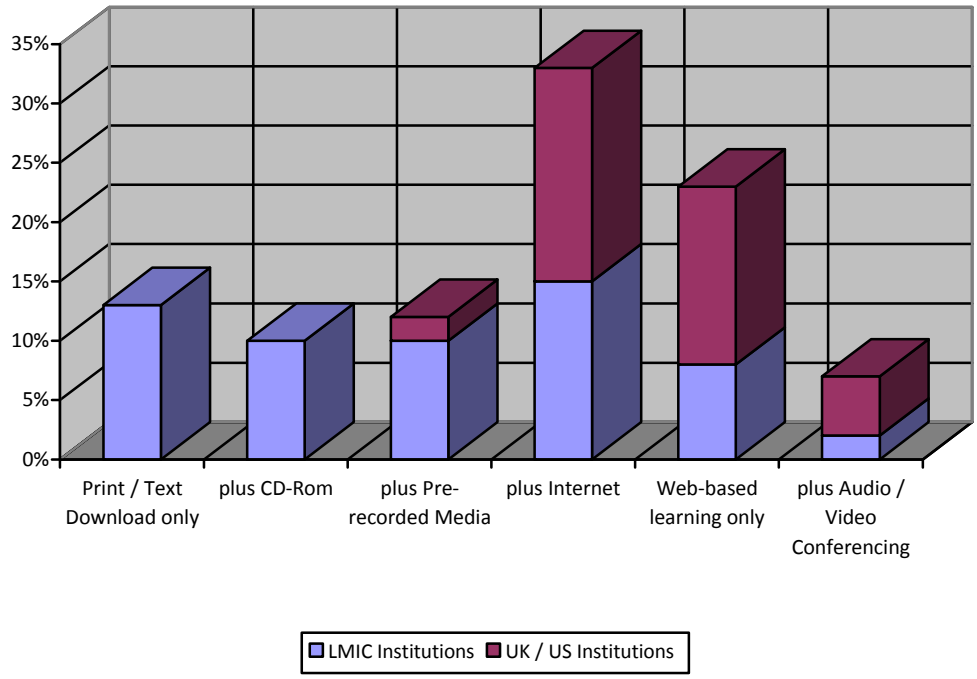
- adequate opportunities for reflection, analysis and discussion, particularly in collaboration with professional and academic peers[x];
- adequate procedures offering both academic and professional guidance, through tutors, mentors and preceptors[xi];
- work-based forums for the application of new knowledge and skills, through:
    - skills demonstration sessions[xii]
    - work-based practical sessions
    - on-going team work[xiii]
    - work-based projects. (see Section 7.2.)

While the widespread use of distance learning in the training of health workers appears to be a relatively recent phenomenon, there is growing recognition of the part that it can play in addressing current constraints on Human Resources for Health (HRH) training in low and middle income countries, as well as its potential to facilitate the applied modalities and approaches to teaching and learning that are seen to contribute to improvements in health worker performance and, subsequently, to strengthening of health systems.

Media and technology in distance learning for health workers

Distance learning for health (DL4H) programmes employ a range of media and technologies to fulfil various teaching and learning functions. The indications are that most media and communications technologies can replicate over a distance the majority of reflective, discursive and demonstrative training inputs of benefit to health workers. Web-based communications mechanisms appear to be particularly valuable to programmes with isolated or widely dispersed cohorts of learners as a means of providing forums for on-going study guidance and exchanges of experience and knowledge. However, questions remain about the feasibility of using these mechanisms in programmes where learners and provider institutions are based in low-resource settings. The only exception to the general range of teaching and learning possibilities that can be provided purely through ICTs and other media alone appears to be the regular professional interaction with the working environment, a key component of health worker training that is reliant on programme provider institutes working in partnership with health institutions to ensure that the benefits are felt.

Table ii: Distribution of media and technology usage across distance and blended learning programmes (N = 40)



Of the 40 programmes featured in the case studies, while five out of 40 use text-based materials and print media only, a further 22 use print media in conjunction with some other form of media or technology, including 13 that use it in conjunction with the Internet. Four out of 40 programmes use CD-Roms; five out of 40 programmes use pre-recorded media. While nine out of 40 programmes use web-based media as the sole means of programme delivery rather than providing hard-copy packages of learning materials, it is anticipated that they will also give learners the option of downloading and printing text-based materials. Only three programmes use audio- or video-conferencing as a formal means of teaching and learning delivery.

For distance learning programmes for health workers in low and middle income countries, the process of identifying media and technology according to suitability is therefore determined less by issues of academic functionality, and more by other contextual criteria, such as relative accessibility, reliability, ease-of-use and cost, both to the institution and the learner (see Section 7.4.).

The practicality of Web ICTs

The distribution of media and technologies described here gives some indication of the growing popularity of web-based communications as a means of facilitating teaching and learning at a distance. However, an interesting feature that emerges from these examples, particularly those from provider institutes in low and middle income countries, relates to the continued use of more traditional media such as pre-recorded audio or video, telephones and print. Requisite investments in ICT infrastructure and electricity are necessary for e-learning, and whilst this is an area of growth in low and middle income countries, questions have to be asked about the feasibility of using such technologies for teaching and learning at a distance in low-resource settings. While it is not possible to judge the effectiveness of such technologies as used by the programmes featured in the case studies, this review has already noted the general lack of facilities and equipment available to medical schools in sub-Saharan Africa (see Section 3.2.1.). The same restrictions are seen to apply with regard to communications technology in particular:

- at Jimma University, Ethiopia, power and telecommunications are described as 'unreliable';
- at Ibadan University, Nigeria, there are daily power outages and departments have to purchase generators;
- at Catholic University, Mozambique, there are insufficient computers and a restriction on Internet connectivity[xiv].

The current scenario may pose challenges to the scalability of e-learning approaches. It might be assumed that if such restrictions exist at the provider institutes, it is highly likely that they are intensified for the isolated, non-urban settings in which a significant proportion of learners on national distance learning programmes are likely to be based. Technology infrastructure and Internet bandwidth may limit the use and application of these in some low and middle income country contexts, and mechanisms need to be put in place to ensure quality of content[xv]. At a regional or local level, the deficit in information technology and bandwidth is depriving learners of the possibility of benefiting from the rapidly advancing developments in Internet learning[xvi].

Programme design considerations in distance learning for health workers

Planning for distance learning for health professionals must take account of a range of factors:

1. available, usable and sustainable technology;
2. systems and managerial tools that improve the performance of students, health workers, trainers and educators;
- established structures of communication and information sharing across health systems;
- establishing advice and support systems, including technological support systems xvii.

In terms of the design of a DL4H programme, key principles include:

- a clearly defined programme of study relevant to the clinical and managerial realities of any given health system;
- a syllabus based on a scope of the subject developed in accordance with any appropriate professional body;
- supply of all essential study materials to minimise the need for frequent visits to medical libraries;
- using a variety of educational methods for teaching and learning;
- support for the learner that is locally accessible and not time-consuming;
- realistic academic demands made on the learner;
- incorporating methods of assessment that are relevant to the course objectives deliverable with limited resources xviii.

These points highlight the importance of taking into consideration a number of elements in the design and delivery of distance learning training programmes for health workers. Clarity over the academic and logistical background of the audience, together with the needs and requirements of the learners, is central to effective programme design. Engagement with and support from national or local health authorities and the various clinical and non-clinical institutions involved in the delivery of health services is central to effective programme delivery.

Programmes need to seek integration with existing health systems and health training mechanisms, in order to:

- operate with support from existing health systems and structures – teaching hospitals; local health authorities; health strategies and policies [xix;]

- engage with other sector-wide inputs related to health systems strengthening and health worker performance;

- form part of a continuum of training alongside other programmes.

Evidence of the impact of distance learning on health worker performance and health outcomes

It is difficult to provide substantial evidence of the impact of distance learning programmes on either health worker performance or improved health outcomes. This in part is due to the age of many of the programmes reviewed in the case study. At least half started during or after 2007, which limits the amount of information available for evaluation.

The process of impact evaluation in health training is complex and demanding, and should take into account additional factors that influence the professional environment and health services provision: particularly in light of the sector-wide approach to health systems strengthening advocated for by the WHO.

Current indications suggest that many provider institutions do not have the time, resources or expertise to design and conduct a detailed evaluation of a programmes' impact. In addition, evaluation is often seen as an external process that should be carried out by a commissioned independent evaluator.

Ultimately, there is a lack of clear guidance available to providers of distance learning on the evaluation of programmes impact on health outcomes or health worker performance and further information is needed before a full judgement can be made (see Section 8).

Clearly, there is a need for a more systematic approach to evaluating the impact of DL4H on health worker performance and health outcomes.

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Section 1: Introduction and background

1.1. Introduction

A skilled and motivated health workforce is central to a strong, effective health system. In September 2010, UN Secretary General Ban Ki Moon highlighted in the *Global Strategy for Women's and Children's Health* the need for 3.5 million more trained health workers to achieve the Millennium Development Goals (MDGs) (UN 2010). The Secretary General called upon partners to 'work together... and provide coordinated and coherent support to help countries develop and implement national health plans that include strategies to train, retain and deploy health workers.'

One of the major challenges in addressing this shortage is the need to train and educate large numbers of health workers, in particular community workers in low and middle income countries (LMICs) (Global Health Workforce Alliance 2008). In order to address this challenge, there is a real need to develop and evaluate new and innovative ways of training.

Distance learning (DL) for health is one such method that is gaining popularity as a means of providing education and training to health professionals in LMICs. This growth in popularity stems from the potential advantages conferred by DL as a mode of education including: greater and easier access, low cost, scope for capacity strengthening and the potential for 'in career' training which can indirectly contribute to better retention of the workforce.

Despite this growth in the use of DL there has to date been little formal research analysing it as a mode of delivering training and education for health workers in LMICs. It was with this in mind and in support of the UK governments programme of work on human resources for health that the Department of Health commissioned the London International Development Centre (www.lidc.org.uk) to review and analyse current Distance Learning for Health (DL4H) programmes used for training health workers in LMICs. The aim of the review was to identify patterns of success and impact, and outline likely trends in the nature and provision of DL4H in LMICs hence informing future policy, research and investment in DL4H.

The primary objectives of the review were to:

- review current DL activities available to health workers in LMICs;
- identify aspects of DL delivery and design that comply with effective educational models/ approaches used in the training of health workers;
- analyse the contribution that DL programmes could make in strengthening the capacity of health systems in LMICs.

This report provides a detailed overview of the review which took place over 15 months between 2009 and 2010. The report starts in Section 1 with an overview of the approach taken and methods used. Section 2 provides an outline of the global policies on human resources for health providing some background on the current political context within which DL can play a part. Sections 3-5 provide an analysis of the current training needs of health workers and an overview of DL and the context within which it may be an effective tool for training and educating Health workers. Section 6 and provides examples where DL is used in health from analysis of case studies, while Section 8 summarises evidence on the impact of DL in health. The report concludes in Section 9 with a summary of the key findings and finally provides recommendations for future research or guidance in Section 10.

1.2. Approach and Methods

A steering group was convened to provide oversight throughout the period of the review. The group helped determine the scope of the review and research methods to be used in the review. The review was conducted in five parts:

1. an initial scoping exercise to determine the boundaries of the review (see table i);
2. a review of current international policy and strategy on human resources for health (see Section 2);
3. a survey of current provision of DL4H programmes globally (the means by which this data was sourced is discussed in Section 6). This survey was conducted in two stages; an initial desk-based survey followed by consultation with relevant provider institutions and individuals in the UK and internationally to validate information and findings on a case-by-case basis, and identify further relevant programmes for the review (see Sections 3-7);
4. the DL4H International Workshop. This was held on 26th- 27th October 2010, in collaboration with the University of London's Centre for Distance Education Annual Conference and was used to test the validity of some of the conclusions from the review regarding current practice in DL4H. The conference also allowed the collection of further information on programme design and delivery and provided a forum where practitioners, academics and policy-makers could share views on the current and potential future uses of DL methodologies for teaching health workers in LMICs. Finally, the conference offered the opportunity to establish networks of practice and support among partners including academic institutions, government departments, professional bodies, and NGOs;
5. preparation of the final report. Each section of the report went through a rigorous editorial process, including comment and approval by the DL4H Advisory Board.

1.2.1. Literature Review

The approaches described below were used to gather literature for the review.

1.2.1.1. Health Training and HRH Policy and Strategy Review

- Online searches were performed of the websites of key international policy-making institutions, including the UN MDG Commission, WHO, GWHA, the European Commission, and the UK government.
- Key documents were selected, including major policy documents, commentary reports, annual progress reports, and country case studies. Further documents were identified through recommendation by Advisory Board members. Additional information on emerging policy and strategy was gathered through press releases and web-based news items.

1.2.1.2. Health Systems Strengthening and Health Worker Training

- Databases such as the International Bibliography of the Social Sciences (IBSS), Web of Knowledge, Medline, Cochrane Library, and Google Scholar were searched to identify published literature on health systems strengthening and health worker education and training between July and August 2010.
- Additional references were sourced from websites such as the Global Health Workforce Alliance (GHWA) Knowledge Centre, the Human Resources for Health Global Resource Centre, and the sub-Saharan African Medical Schools Study (SAMSS).
- Keywords such as distance education, education, postgraduate, training, pedagogy, andragogy, performance were used together with med*, nurs*, dent*, pharm* and health worker*.
- 110 appropriate articles were identified. A number of French and Portuguese articles was also included in this review.

1.2.1.3. Open and Distance learning

- Library searches were undertaken at the Institute of Education Library, Cambridge University Library, and Homerton College Library, Cambridge, using the keywords: DL; distance education; open learning;

open and DL; ODL; DL and development; DL and health. Texts were assessed for relevance.

- Further literature relevant to DL4H workers in LMICs was identified via searches of the following web-sites and information portals:

  Eldis - http://www.eldis.org/go/topics/dossiers/human-resources-for-health
  The Commonwealth of Learning - http://www.col.org/
  The Pan Commonwealth Forum - http://wikieducator.org/PCF5

Table iii: Table outlining the scope of the review

Inclusion criteria	*Exclusion criteria*
General criteria	
• Programmes where the learner received the majority of teaching and learning components in isolation or at a distance from the provider institution • Programmes provided in English, or programmes that had documentation available in English, were reviewed • Programmes designed for or accessible to healthcare workers based in LMICs (as defined by current World Bank criteria and country league tables) (World Bank, 2010) • Programmes targeted towards healthcare workers including low- and mid-level health workers, and community-based health workers	• Programmes where training is conducted in person between the learner and the teacher • Programmes not in English or where there is no available documentation in English • Programmes primarily designed for health workers in high income countries •
Training content and objectives	
• Programmes designed to develop competencies of practising health workers, particularly programmes addressing priority training areas (see Section 3), such as developing specific clinical skills or competencies including management; research; education and training; health administration • Programmes designed to enable health workers with a basic qualification to practice as health professionals • Programmes offering recognised and accredited post-graduate certificates, diplomas and degrees in medical and health-related disciplines. These must be assessed using formal mechanisms e.g. project work, assignments, dissertations and written/ practical examinations	• Short courses delivering stand-alone modules designed to update the skills of qualified professionals • Courses or modules designed for ongoing CPD training • Unaccredited or non-formal programmes of education or professional awareness
Provider institutions	
• Programmes provided by: o Universities with programmes that enrol trainees from LMICs o Universities based in LMICs with domestic DL programmes o Colleges of medicine providing national or international DL programmes o International/ national NGOs and development agencies or funders that support international, regional or national DL4H programmes delivered in collaboration with tertiary-level educational institutions	Programmes offered by: • Unaccredited institutions • Programmes offered by NGOs, development agencies or funders that are not in collaboration with a tertiary level educational institution

1.2.1.4. Case studies

- Literature on research projects, pilot programmes, and programmes of relevance to the scope of the review was gathered using a number of means, including via searches of the following web-sites and information portals such as the HRH Global Resource Centre, Eldis, The Commonwealth of Learning and the Pan Commonwealth Forum.
- Further case studies were identified through searches of websites hosted by provider, funder or partner institutions, including university and medical colleges, donors and funders, national and international NGOs, government, MOE and MOH sites.
- Detailed programme information on specific cases was gathered from sources including the provider institution websites, annual programme reports, published academic papers, and through contact with and written requests to institutional staff such as Deans of study, programme directors, course administrators, and tutors.
- Where institutions were unable or unwilling to share programme documents with the review, the researchers completed the case study template themselves, using the information they had available.

1.3. Limitations

There are a number of limitations to this review.

Firstly, the range of programmes featured here are limited to those provided in English, or where there is substantial documentation available in English. This leads to a particular bias on activities in Anglophone sub-Saharan Africa, and the Indian sub-continent, and excludes the range of DL4H activities that may be on-going in LMICs in a number of parts of the world, in particular Latin America, Francophone Africa, Central Asia and South East Asia. Similarly, the range of international programmes featured is, with the exception of some regional examples, exclusively drawn from provider institutions in the UK and the US. This excludes the range of international programmes that may be provided by institutions based in mainland Europe, Scandinavia, Eastern Europe, Russia, China, Korea or Japan.

Secondly, the scope of the review focuses on accredited post-qualification programmes for the training for health workers. This includes only those programmes that offer some form of certification for completion, and therefore excludes those that may be at the pilot stage of delivery, or used for unaccredited CPD, or delivered by a non-accredited institution (e.g. an NGO).

With these two points in mind, the range of programmes discussed during this review can only be regarded as a partial or sample indication of the range of activities in DL for the training of post-qualification health workers in LIMCs, and not a representation of a full range of activities in DL4H at the global level.

Thirdly, due to limitations of available documentation, the review has been unable to undertake a detailed analysis of the programme design approaches used by provider institutions. As discussed in Section 7, this makes it difficult to identify the specific range of pedagogic approaches or teaching and learning principles that underpin current practice in DL for health workers.

1.4. Achievements

This review has succeeded in undertaking research in a previously under-investigated area of health worker training in LMICs, and in so doing, made the case for the potential value that DL methodologies may have in addressing current HRH priorities at the global level. It has gathered and analysed data on current practice in DL for health workers that was previously unavailable in the public sphere and from this established a basis

from which DL4H programmes might be analysed in the future. As such, the review contributes to the establishment of guidelines for policy-makers and practitioners. Finally, through the activities of the desk-review and the DL4H International Workshop, the review has contributed to the formation of a global network of DL4H professionals, establishing a forum for contact between tertiary education institutions, NGOs, donors, funders and government agencies.

Section 2: A summary of international health training policy and strategy

2.1. Introduction

This section provides a summary of key policies from the United Nations and the Millennium Development Goals, The World Health Organisation and its Global Health Workforce Alliance, WHO / PEPFAR, the European Commission, and the UK government, related to the training of Health workers outlining:

1. relevant global health training priorities, target audience, content, and beneficiary communities;
2. the links between health training priorities and broader health policy objectives;
3. the extent to which DL is outlined as a key component for implementation/success of objectives related to health workers training as outlined by these policies.

2.2. Current health training priorities at the global level

2.2.1 Health training and the UN Millennium Development Goals

The current health training priorities at the global level for both international and national institutions are determined in part by the health priorities set out in the Millennium Development Goals. Of the eight goals, three are targeted at health in particular:

- goal 4 aims to reduce by two thirds the under-five mortality rate between 1990 and 2015;
- goal 5 aims to reduce by three-quarters the maternal mortality ratio and achieve universal access to reproductive health;
- goal 6 aims to have a) halted by 2015 and begun to reverse the spread of HIV/AIDS; b) achieved, by 2010, universal access to treatment for HIV/AIDS for all those who need it; and c) halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Goals 1 and 7 also have important health targets on hunger and sanitation, respectively. The UN and its associated MDG commissions recognise the challenges faced by healthcare systems in seeking to achieve these goals, and the central role of health workforce development in overcoming them. In 'Keeping The Promise: United to achieve the Millennium Development Goals' (United Nations, 2010a), the UN underlines this through its commitment to 'efforts to reduce maternal and child mortality and improve the health of women and children, including through strengthened national health systems'.

In the Global Strategy for Women and Children's Health 2010 (United Nations, 2010b), the UN places an emphasis on the role of 'stronger health systems, with sufficient skilled health workers at their core' as a means of improving health. The need to 'support efforts to strengthen health systems to deliver integrated, high-quality services... especially at the community level and to the underserved, and manage scarce resources more effectively' and through health workforce capacity building 'to address critical shortages of health workers at all levels... [and] develop and implement national health plans that include strategies to train, retain and deploy health workers' is highlighted (ibid.).

In relation to health workforce capacity building in particular, and drawing on the 2006 World Health Report 2006, Resolution WHA 59.23 'Rapid scaling up of health workforce production', states that:

> 'shortages of health workers are interfering with efforts to achieve the internationally agreed health-

related development goals, including those contained in the Millennium Declaration, and those of WHO's priority programmes;'

'in many countries, notably those in sub-Saharan Africa, there is inadequate capacity to train sufficient health workers for adequate coverage of the population;'

'many countries lack the financial means, facilities and sufficient educators to train an adequate health workforce' (United Nations, 2006)

Freedman (Freedman et al., 2005), when looking at transforming health systems to better support the health-related MDGs for women and children, on behalf of the UN Millennium Project Task Force on Child and Maternal Health, also highlights the need for trained health workers, stating that:

'One enormous barrier to providing these interventions [related to MDGs 4 and 5] is the lack of adequately trained providers deployed at the appropriate levels of the health system and geographic locations — a problem intensified in recent years by massive migration of health professionals from poor countries to rich countries (the so-called 'brain drain') and by HIV/AIDS, which has decimated the health workforce in some high-prevalence countries.' (p. 9)

The role of health systems management in attaining universal access to care and in ensuring an equitable distribution of the health workforce, is drawn out further in 'Keeping The Promise: United to achieve the Millennium Development Goals' (United Nations, 2010a), which reiterates a commitment to:

'Reviewing national recruitment, training and retention policies and developing national health workforce plans, based on lessons learned, that address the lack of health workers as well as their uneven distribution within countries, including in remote and rural areas, and throughout the world, which undermines the health systems of developing countries, in particular the shortage in Africa, and in this regard recognising the importance of national and international actions to promote universal access to healthcare services that take into account the challenges facing developing countries in the retention of skilled health personnel in light of the adoption of the World Health Organisation code of practice on the international recruitment of health personnel, adherence to which is voluntary;' (p21)

It is worth noting that health provision is explicitly viewed by the UN MDG project as a means of addressing social inequality across geographically isolated locations and socially marginalised communities, namely 'reducing poverty, social exclusion and inequity, and advancing democratic development and human rights'. Within this context, the professional empowerment and training of health workers based in the community is seen as a priority. In doing so, and in addressing the aims of the Millennium Development Goals 4 and 5, health systems in general must change professional regulations, practice and training policies in order to empower mid-level providers (Freedman et al., 2005). Doing so would be seen a contribution towards the renewed commitments to:

'Expanding the provision of comprehensive obstetric care and strengthening the role of skilled healthcare providers, including midwives and nurses, through their training and retention in order to fully utilise their potential as trusted providers of maternal healthcare services' (United Nations, 2010a)

The UN MDG Task Force makes a number of policy-level recommendations to assist in achieving the above within the limitations of current human resources availability. Firstly, community health workers should be enabled to perform key child and newborn health and reproductive health interventions within the community, under supportive health supervision. Secondly, the importance of skilled birth attendants in addressing maternal mortality 'must form an explicit part of all health workforce plans' and be equipped to perform life-saving procedures safely and effectively (United Nations, 2009), (United Nations, 2010a). Examples of training to address this include the national training programme for birth attendants in

Bangladesh (World Health Organisation, 2008a). Thirdly, mid-level health providers, such as midwives, surgical technicians and general medical practitioners, should be trained to perform additional procedures often restricted to specialist physicians, safely and effectively e.g. procedures including all basic emergency obstetric care functions, anaesthesia and caesarean section (ibid. p9).

2.2.2 Health training and the World Health Organisation

In keeping with the UN Millennium Development Goals Task Force on Child and Maternal Health, the World Health Organisation (WHO) also places particular emphasis on the importance of human resources for health.

WHO states that in many countries, particularly in Africa, the shortage of health service staff has become one of the most serious constraints in achieving the MDGs in particular in scaling up the response for HIV/AIDS under MDG 6. Data shows that almost 90% of the population in Africa lives in areas where there are less than five doctors per 10 000 people, and more than 60% have less than five nurses or midwives per 10 000 population. This situation is further exacerbated, particularly in sub-Saharan Africa by the impact of the HIV epidemic on health workers themselves (World Health Organisation, 2005), and by the migration of trained health personnel to health systems overseas.

In terms of training, WHO places emphasis on upgrading the range of skills among community-based health workers in particular, to strengthen essential emergency and surgical skills and knowledge of primary health care.

2.2.2.1 The Global Health Workforce Alliance

WHO, in response to the important emphasis placed on human resources for health, formed the Global Health Workforce Health Alliance (GHWA). The GHWA is a commission whose aim is to address the 'worldwide shortage and mal-distribution of health workers' (World Health Organisation, 2008f). The GHWA Strategic Plan (2006) states that:

> 'We now have abundant evidence demonstrating that progress in health in the poorest countries will not be possible without strong national health systems for which the workforce is essential. The workforce determines health outputs and outcomes, drives health systems performance, and commands the largest share of health budgets. Yet shortages are widespread, with a gap of more than 1 million health workers estimated for Africa alone. Uneven distribution deprives many groups of access to life-saving services, a problem compounded by accelerating migration in open labour markets that draw skilled workers away from the poorest communities and countries.'
> (World Health Organisation, 2006)

The GHWA advocate for the close coordination of national and international initiatives focused on human resources for health, and argues that the shortages in health workers in LMICs are closely related to the demand for health workers across Europe and North America. To address this, they would see a system for a) the global exchange of information on national health worker education and training plans and predicted needs for health workers, and b) the negotiation of the short-term recruitment of health workers from abroad, within the context of an international agreement on migration.

The GHWA vision of training sees health workers educated and trained at the national level by higher education institutions, in a regulated system that includes modules taught 'in the community as well as in the classroom' (World Health Organisation, 2008e). The GHWA advocates for a universal model of training where all health workers have the opportunity for a flexible career path, rather than being constrained to remain at a particular level. This training model would see individuals qualifying as community health workers in about a year, and then having the option to work towards mid-level qualifications, or become higher level registered nurses, nurse specialists or doctors. Individuals would regularly take additional training to refresh their skills and knowledge in key areas, relevant to their focus or specialty.

Examples of the application of this approach are found in training initiatives globally. In order to meet the high burden of disease and mortality at primary care level and improve healthcare access in rural and deprived communities, health worker skills should be tailored to meet health needs and often involve an initial focus on community- and mid-level workers. GHWA cites the early example of Thailand from the 1970s to the 1990s, where the government concentrated on rapidly training community- and mid-level personnel, while gradually expanding the production of higher-level professionals.

In keeping with the priorities identified by the UN MDG Task Force, GHWA concurrence with this approach is found in the further examples of systems-wide development they are seen to support. A current example is that of Ghana, where the Ministry of Health identified the need to train more mid-level health workers and make a long-term shift of resources into this area. This strategic decision is based on evidence from elsewhere in sub-Saharan Africa demonstrating these workers' cost-effectiveness, distribution and efficiency. Anecdotal evidence suggests that doctors are essential for supervision, but resist rural postings. It is claimed that much can be achieved in Ghana using mid-level workers to serve more remote areas, and based on this the intention is 'to double the training of mid-level workers in two years' (World Health Organisation, 2008e). This range of newly-trained workers – nurses, medical officers, community health nurses, technicians, 'health assistants' – will then populate the expanded numbers of health centres being simultaneously built across the country (World Health Organisation, 2008c) based on a formalised rural working incentive scheme. This model is discussed further in Section 3.

Similarly, in Ethiopia, the Ministry of Health has estimated that '60 to 80% of the country's health problems are due to largely preventable communicable diseases such as malaria, pneumonia and tuberculosis' (World Health Organisation, 2008b). The Health Extension Programme, launched in 2004, aims to address this through a community-based approach focusing on prevention and the creation of a healthy environment. But with 85% of a population of 77.3 million living in rural areas, it was seen as difficult to ensure effective coverage of essential healthcare interventions. To help, a new cadre of health extension workers has been introduced, delivering essential interventions on the above diseases. The goal in 2008 was to train 33,000 health extension workers by 2009 – two for every village in the country – an HR expansion supplemented by an increase in training across the board, including health officers and doctors (World Health Organisation, 2008b).

Further examples of system-wide training of community- and mid-level health workers, include Brazil's PROFAE programme, for the training of nurse auxiliaries and technical staff, launched in 2000, and its follow-up programme, PROFAPS, run from 2005–09 (see case study: PROFAE / PROFAPS). In Pakistan, the Lady Health Worker Programme, working with rural communities across the south of the country, was launched by the Ministry of Health in 1994 and remains an integral part of the Prime Minister's Programme for Family Planning and Primary Healthcare (World Health Organisation, 2008d). In India, the National Rural Health Mission (Case study: NRHM: District Health Management), launched in 2005, aims to increase access to healthcare services by addressing specifically the critical shortages of health workers in rural areas (World Health Organisation, 2008e).

GHWA also favours interventions on human resources for health being developed taking individual cultural and medical contexts into account. In the Islamic Republic of Iran, GHWA cites examples where rural health workers are selected from local populations and trained locally in the context within which they will practise, to ensure they can respond to community health needs. GHWA also supports initiatives where HRH efforts are directed towards a specific medical issue. For example, the high rate of maternal mortality in Bangladesh has led to a focus on strengthening training for emergency obstetric care provision (World Health Organisation, 2008e).

2.2.2.2 The WHO / PEPFAR Initiative

Investment in the training of front line health workers is only seen as one element contributing towards the strengthening of health systems. In order to be effective, training inputs are also seen as reliant on parallel investments in service delivery mechanisms, health information, health technologies, systems financing, and leadership and governance (World Health Organization, 2007). Investment in systems for health education and

training play a vital role and this is demonstrated by WHOs collaborative initiative with the US President's Emergency Plan for AIDS Relief (PEPFAR).

WHO / PEPFAR makes the case that in order to provide the requisite scale-up of health workers there needs to be a parallel scale-up of capacity at educational institutions (World Health Organisation, 2009b), and highlights that many teaching institutions for health workers have insufficient basic infrastructure and facilities, insufficient financial and management capacities, and insufficient numbers of educational and training staff to meet current demands (Frenk et al., 2010). They also identify the need to 'place medical and nursing education in the context of the health system so that education, training, research and service delivery work in synergy, not isolation' (ibid. p4). In practice, this will involve moving away from the 'preponderance of specialist hospital-centred training' (ibid. p5) and instead placing learners in the community, so that they understand the social and cultural expectations and medical demands faced by the population in their context. This approach aims to ensure that the education and training provided to health workers is appropriate and relevant to the needs of the population (ibid.).

This is part of an approach termed 'Transformative Education' for health workers, an approach based on the principle that the health workforce, training approaches, the national health system, and the health needs of the local community are all 'mutually interdependent' and that provision of training to health workers with the objective of improving health at the community level relies on active engagement between these sub-sectors (World Health Organisation, 2010). At its most basic, it is an approach that relies of the process of embedding education and training within health services and delivery systems, and the decentralisation of medical and nursing education (ibid.p3).

2.2.3 Health training and the European Commission

The European Commission recognizes priorities outlined by the MDGs. However, it holds that progress toward health MDGs is uneven and largely off track in most developing countries, where 'close to 15% of children in sub-Saharan Africa still die before the age of five' and 'maternal mortality rates have barely declined at all' (European Commission, 2010a). It also recognises the impact of the crisis of human resources for health within this (COM 2006.870, cited ibid. p4).

However, in approaching these issues, the European Commission advocates for improvements to systemic regulation, coordination and information sharing between partner institutions and agencies at the global level, and a 'holistic "systems" approach' to tackling health needs (ibid.p5). As part of this, the EU seeks to concentrate its support in this area on 'strengthening of health systems, as a means of ensuring that the main systems components – health workforce, access to medicines, infrastructure and logistics and decentralised management – are effective enough to deliver basic equitable and quality health care for all.' (ibid. p6)

Within this, the EU seeks to address the global health workforce crisis primarily by addressing current trends in international migration of health professionals from health systems in LMICs to those in higher-income countries, and by engaging support and commitment to the WHA Code of Practice on the International Recruitment of Health Personnel (ibid. p8;) (European Commission, 2010b).

However, in general terms, the EU also recognises that 'more investment will be needed in capacity building for health professionals and workforce planning; quality and availability of education and training for health professionals needs to be improved; the potential for Regional Policy programmes and other tools such as the Lifelong Learning Programme needs to be recognised'; and commits, again in general terms, to taking action at different levels in order to strengthen 'countries' ability to train, support and retain healthcare personnel' (ibid. p7).

2.2.4 Health training and the UK government

The UK government's Department of Health is a major stakeholder in the training of health workers in LMICs,

both as a significant employer of health workers from around the world, but also in terms of the support that the UK government provides to developing countries in the Commonwealth and elsewhere. For instance, this review was originally commissioned as a result of the UK government commitment made in the 2008 Global Health Strategy 'Health is Global' to 'increase our support for distance learning resources for professionals in low- and middle-income countries' (HM Goverment, 2008).

The coalition government's commitment to development is represented in the first instance by their plans to honour the UK's international commitments and support actions to achieve the Millennium Development Goals (Department for International Development, 2010a), and by the formal adoption of the outcome document from the UN MDGs Summit in September 2010 'Keeping the Promise: United to Achieve the Millennium Development Goals' (UK government, 2010). Further evidence is provided by the government's maintaining of the current overseas aid budget, together with plans to honour the UK's commitment to spend 0.7% of gross national income on overseas aid from 2013 (Department for International Development, 2010b).

Regarding support to health in LMICs, emerging policy from the current coalition government has placed a particular emphasis on issues associated with maternal and child health, malaria, and water and sanitation. This will involve 'specifying DFID's objectives on (a) increasing access to clean water, sanitation, healthcare and education; (b) reducing maternal and infant mortality; and (c) restricting the spread of major diseases like HIV/AIDS, tuberculosis and malaria' (Department for International Development, 2010a).

In terms of specific outcomes in these areas, for maternal and child health, the UK government has committed to 'save the lives of at least 50,000 women in pregnancy and childbirth, 250,000 newborn babies', and 'increase the number of births in developing countries attended by skilled midwives; and improve access for mothers and newborns to high quality post-natal care'(Department for International Development, 2010b).For malaria, the government has committed to 'help halve the number of deaths caused by malaria in at least ten African countries by 2015 by increasing access to malaria prevention, diagnostics and treatment' (ibid.) and is in the process of identifying ways in which they can spend up to £500 million per year in tackling this disease. In formulating their approaches towards doing so, the government has undertaken a post-MDG Summit consultation process, and published separate Evidence Papers and Business Plans for both reproductive and maternal health, and malaria.

Within these identified priority areas, specific approaches to human resources for health and to the training of health workers in LMICs are yet to be detailed. However, DFID currently provides £500,000 a year to support WHO's Global Health Worker Alliance (GHWA) (Beattie, 2010). In addition, the Health Partnership Scheme (HPS), launched in November 2010, is designed to provide direct support to and exchanges of expertise between NHS Health workers and their counterparts in LMICs. The emphasis is placed on teaching, training, practical assistance and service delivery with a view to raising professional standards, particularly in those areas of health priority identified above, and includes work placements as well as distance support modes (Torjesen, 2010).

2.3 The place of distance learning as a training implementation device within current policy and strategy frameworks

Throughout the majority of policy documents reviewed above, there is a recognised need for the recruitment and training of health workers to be scaled up in order to address the needs of health systems both in LMICs and elsewhere. This view is expressed particularly in light of the anticipated failure to meet the Millennium Development Goals by 2015. In addition, key international organisations such as the UN and the WHO are placing emphasis on the need to recruit and train up mid-level health workers, particularly those working at the community level and in remote and rural settings.

Within this, WHO / PEPFAR identify the need for a parallel investment in the education and training infrastructure for health workers and the need to make training more appropriate and relevant to the needs of

the population (World Health Organisation, 2009b). The approach they advocate for in doing so is to place learners in the community as part of the training process and to decentralise the educational infrastructure for health workers away from predominantly urban educational institutions and teaching hospitals (ibid.p5).

However, in general, policy and strategy do not give a prominent place to the roles that DL and communications technology could have in assisting the provision of such decentralised modes of training to these priority cohorts of community-level workers. In the general context of improving the management and organisation of health systems, including HR strategies, there is acknowledgement of the potential that communications technology can play in facilitating this process at a distance. This includes activities such as the sharing of knowledge and research, particularly within the context of improved collaboration and coordination between partner institutions. The UN MDGs Summit Outcomes 2010 advocates for 'further promoting research and development, knowledge-sharing and the provision and use of ICT for health' (United Nations, 2010a). The GHWA Knowledge Strategy 2009 – 2011 envisions such an approach as a means of establishing international communities of practice and putting educational institutions, donors and health professionals in the north and south together. This includes recruiting new and innovative technologies in addressing the problem of scaling up training quickly and effectively (World Health Organisation, 2009a). This theme is also highlighted by the GHWA in 'Scaling Up, Saving Lives', which would endeavour to see health workers using ICTs to seek advice on specific health problems and to share data (World Health Organisation, 2008e).

The EU supports the application of information and communication technologies for health ('eHealth') in circulating 'basic research, clinical research and public health and health services research' (European Commission, 2010a) and enhancing global health networking possibilities. They argue that eHealth is inextricably linked to the challenges of research dissemination, knowledge sharing and health systems development, and the opportunities offered by ICTs should be exploited further.

The UK government also puts the case for exploring the opportunities offered by new technology, not just in terms of information sharing and networking, but also in enhancing the work of medical practitioners. They are interested in testing the possibilities offered by new communications technologies and other digital innovations, and cite cases of mobile phone technology being used to help more women give birth safely, and the use of mobile technology for emergency referrals and operations (Department for International Development, 2010b).

In terms of communications technology as an educational device for the training of health workers, the 2006 WHA Resolution 59.23 on 'Rapid scaling up of health workforce production' states that health worker training initiatives should seek to use 'innovative approaches to teaching in industrialised and developing countries, with state-of-the-art teaching materials and continuing education through the innovative use of information and communications technology'(United Nations, 2006).

The GHWA also sees the use of technology expanding from knowledge sharing and support mechanisms to include the direct training and education of health workers 'based on competencies and delivered through DL and ICTs' (World Health Organisation, 2008e) and 'the use of tools such as "illuminate" for on-line tutoring and exchange of ideas and practice (World Health Organisation, 2009a). The mention of DL in the form of online tutoring is particularly appropriate given that GHWA's priority training emphasis is on seeing health workers educated and trained at the national level by higher education institutions, in a regulated system that includes modules taught 'in the community as well as in the classroom' (World Health Organisation, 2008e). The UK government's Health Partnership Scheme also encourages the use of innovations in technology in enhancing practitioner exchange, such as live Internet link-ups, although the extent to which they visualise this as a formal educational mechanism is unclear (Torjesen, 2010).

However, beyond these statements of support for the innovative use of ICTs in coordinating health systems and staff at a distance, DL has very little presence within those policy and strategy documents seeking to address the global crisis in HRH, whether it is in LMICs or in industrialised countries.

2.4 Conclusions

Many of the health worker training priorities identified above place the emphasis on training primary care providers, community-based workers, and low- and mid-level health workers in particular. It should be noted that, depending on national circumstances and also the precise skills that are required of those workers, this may involve the provision of initial or pre-service training. For example, this might be particularly associated with the 'up-scaling' initiatives advocated for by policy makers as a means of developing a critical mass of accessible health workers. Such initiatives are not discussed within this review, which focus on those training inputs which can be described as 'post-qualification'.

It is important to note at this stage that some of the Human Resources for Health needs identified above are not priorities that can be solely addressed through training. For example, concerns over the 'maldistribution' of health workers, both globally and domestically, as expressed by both the GHWA and the European Commission, and acknowledged by the UK government, is primarily an issue of human resources management. While there are some aspects of human resources recruitment and retention that can be helped through educational interventions, in general it is accepted that the effect of such interventions will be limited unless the training is provided as one part of a framework of broader strategic interventions into enhancing health systems capacity. This model of multiple inputs for systems enhancement and capacity development, and the role of post-qualification health worker training within it, is discussed in more detail in Section 3.

Section 3: An overview of common approaches to strengthening health systems, including post-qualification training

3.1. Introduction

Section 2 of this report highlights two areas of priority identified by international policy and strategy in health worker training for LMICs. Firstly, there is the need to significantly increase numbers of health workers in LMICs by scaling-up of health training, and in particular the training of community-based health workers. Secondly, there is the need to strengthen the capacity of health systems to deliver services more effectively, and to provide greater levels of specialist care. This places a particular emphasis on training health workers at all levels to enhance their professional skills and competencies, both in terms of management and administration of health services, and in terms of developing clinical specialties.

The scaling-up of cohorts of community-based health workers may be largely achieved through pre-service training, equipping workers with the range of skills and competencies required to deliver basic health care. The input of training designed to strengthen health systems capacity by enhancing health workers' managerial, administrative, research and clinical specialties is more closely associated with post-qualification training. As outlined in Section 1 of this report, it is training for post-qualification cohorts of learners that forms the main focus of this review.

In setting out the context in which post-qualification training can contribute to the strengthening of health systems capacity, this section looks in more detail at general approaches and basic inputs for health systems strengthening by drawing on the 2007 WHO Framework for Action on Health Systems (World Health Organization, 2007) a document that has been widely accepted as an appropriate approach for health systems strengthening. Many national governments, ministries of health and donor agencies are using this framework to organise their strategic approaches to health systems strengthening, and as such it is presented here to help determine the commonly-accepted priorities for health systems strengthening.

Drawing on the Framework, this section provides examples of how past and current health worker competency development approaches and training initiatives have contributed to health systems strengthening, and concludes by identifying the key outstanding areas of health worker competency currently required in order to meet existing health systems strengthening needs.

3.2. Health Systems Building Blocks

The 2007 WHO Framework for Action on Health Systems Strengthening defines six interlinked components or building blocks of an effective health system including service delivery, health workforce, information, healthcare technologies (including medicines, vaccines etc), financing, and leadership and governance (World Health Organization, 2007). Health systems strengthening requires that all components and their interactions be developed. This section uses the WHO Framework to outline approaches to strengthening procedures within each component (Table iv).

Table iv: Health systems building blocks and strengthening approaches

Building block	Desirable attributes	Examples of approaches
Service delivery	Needs-based and responsive to effectively, safely and appropriately deliver quality health services in a timely and accessible way	Development of packages of integrated services, delivery models, infrastructure, management, safety and quality, and demand for care (health seeking behaviour)
Health workforce	Fairly distributed in adequate numbers to competently, efficiently and safely provide quality health services where they are needed	Development of national health workforce policies and strategic plans, advocacy for health workforce development, establishing human resource information systems, improving health workforce recruitment, distribution, competence, performance and retention
Information	Enables the generation, interpretation and dissemination of health determinants, health systems performance and health status indicators	Development of facility and population based information and surveillance systems
Medicines, vaccines and health technologies	Equitably accessible and quality assured, safe, effective and affordable	Development of national essential medicines policies, robust regulatory systems, and strengthen procurement and supply chain distribution competence and capacity
Financing	Provides and generates adequate resources in such a way that improves affordability and protects end users from catastrophic costs of healthcare	Development of national health financing policies, updated databases on health expenditure, and strengthening methodologies for costing
Leadership/ governance	Ensures strategic policy and regulatory frameworks for effective and accountable management of resources, processes and system inputs	Development of health sector policies, improve oversight and regulation, strengthen management capacity, strengthen positioning and capacity of civil society to hold leadership accountable

Adapted from WHO Health System Framework, 2007 (World Health Organization, 2007)

The approaches outlined in Table iv can be implemented within a specific scope of service in a 'vertical' (disease specific) approach (e.g. HIV/AIDS programmes) or across the whole health sector in a 'horizontal' (sector wide) health systems strengthening approach. WHO currently advocates for an integrated approach that harnesses both horizontal and vertical approaches and leverages resources from both, to overcome barriers for the achievement of a specific healthcare outcome (World Health Organization, 2007);(World Health Organisation, 2009b). Within this, the design and delivery of the various elements of health worker education, including content, approaches and methods, will be 'responsive to the health needs of a population' and 'determined by a commitment to social accountability' (World Health Organisation, 2010). For example, a recent review of primary healthcare initiatives found that primary care-focused health initiatives have improved the accessibility of healthcare in LMICs and have been demonstrated to be an effective platform for health systems strengthening (Kruk et al., 2010). Generating an understanding of this interdependence of systems is also seen as an important element within post-qualification training for health workers, as it underscores the way in which various aspects of health systems interact with each other in

service delivery (Frenk et al., 2010).

3.2.1. Investment in medical education facilities

Within the structure outlined above, one of the key areas of necessary investment is in medical educational capacity in LMICs, without which the actual upscale and delivery of health worker training is unlikely to take place. Medical education is essential to the development of the healthcare workforce, and operates as an integral part of human resource plans (Mullan et al., 2010a).

However, by current reckonings, the global distribution of medical schools does not correspond well to country population size or national disease burdens (Frenk et al., 2010), and shortages of staff and resources within medical school faculties are described as 'endemic, problematic, and made worse by emigration of healthcare workers' (Mullan et al., 2010a). Such issues are not helped by the perceived lack of opportunity afforded to health professionals who engage in medical education. In sub-Saharan Africa, small salaries, limited career options, heavy teaching loads, growing enrolment numbers, and the absence of facilities, equipment and support staff are identified as some of the main barriers to recruitment and retention of medical teaching staff (ibid.p3), as they put extra pressure on existing staff and promote emigration or relocation (ibid.p4).

3.3. Summary of capacity enhancement needs for strengthening health systems procedures and processes in low and middle income countries

Related to each of the building blocks identified in Table iv, this sub-section provides examples of key health systems capacity enhancement priorities and their accompanying post-qualification training inputs, as catered for by existing or past initiatives provided in LMICs, including both face-to-face and DL. The examples summarised below give general examples of how health systems capacity building priorities have been addressed through post-qualification training. Examples of non-education/ training approaches to capacity building have also been described where available. Broader health workforce training priorities, such as those addressed through pre-service training and education, are not discussed here.

Table v: Capacity building activities for health systems strengthening

Building block	Capacity building priorities	Examples of education/ training approaches	Examples of other approaches
Service delivery	Quality improvement	e.g. Diabetes UK Twinning programme – training of health workers, training of trainers (Beran et al., 2010).	Diabetes UK Twinning programme – strengthening diabetes association, public awareness campaigns(Beran et al., 2010).
Health workforce	HR management	e.g. collaborative distance based Masters of Public Health with a focus on HR management at University of Western Cape, University of Geneva and partner universities with support of donor (World Health Organization, 2010b) (World Health Organization, 2010a) (see Case study)	
	Health worker competence and performance	e.g. obstetrics and gynaecology 5 year residency programme in Ghana (Klufio et al., 2003).	Decision support tools, treatment guidelines, diagnostic algorithms. E.g. – IMCI clinical algorithms(Horwood et al., 2009, Takada et al., 2007, Amaral et al., 2005)
		e.g. an e-health network for Africa – RAFT network – supported by Geneva University Hospitals in Francophone countries since 2000, webcasts interactive continuing education courses (Geissbuhler et al., 2006).	The RAFT network also invested in Internet and satellite connections in selected hospitals and provides support through videoconferences, tele-consultations on clinical cases, and support for telemedicine services (Geissbuhler et al., 2006).
	Scaling up health workers	e.g. the PROFAE programme in Brazil strengthened the nursing workforce and trained 180,000 nursing aides, 72,000 nursing technicians, and 12,000 nursing teachers between 2000 and 2007, partly through distance education (also decentralised on-site training)(Alvores de Silva et al., 2007). (see Case study)	
Information	Developing health metrics research and evaluation skills	E.g. Field Epidemiology Training Programmes (FETP) in Latin America and Africa. (Lopez and Caceres, 2008, Mukanga et al., 2010)	
Medicines, vaccines and health technologies	Procurement and supply chain management	e.g. in-service training of procurement and supply chain managers and staff, building skills of academic staff in four East African countries to conduct assessments of supply management systems and practices (Waako et al., 2009, Matowe et al., 2008, Woodle, 2000)	Joint development of pharmaceutical management training materials, establishing operations research on supply chain management and evaluating effectiveness of skills-building approaches (Woodle, 2000)
	Improving prescribing and dispensing practices	e.g. training of prescribers and dispensers combined with professional feedback on prescribing and dispensing practices was effective in reducing irrational prescribing and poly pharmacy in elderly patients (Bregnhoj et al., 2009)	Development and use of a standard prescribing chart for inpatient use to reduce prescribing errors; reduction of medication errors and inappropriate prescribing through feedback, multidisciplinary teams, and medication reviews (Coombes et al., 2009, Kaur et al., 2009, Wong et al., 2009)
Leadership/ governance	Building healthcare management competence	e.g. 6 month health management skills training programme run by a collaboration between Yale University and Mother Patem College in Liberia supported by Clinton HIV/AIDS Initiative (Rowe et al., 2010)	Problem solving and participatory strategy (Conn et al., 1996)
	Policy development and implementation	e.g., in-service training of health managers (Pappaioanou et al., 2003)	
	Monitoring and evaluation		Development of a common framework for monitoring performance and evaluating progress (World Bank, 2008)

3.3.1. Outstanding health worker competency needs

In terms of systemic need in LMICs, and in relation to the health systems building blocks, a number of significant educator, researcher and management competencies of health workers needs has been identified. Complementary skills for health professionals should include key health system functions such as planning, policy and management, and the training and supervision of basic health workers through collaborative and supportive professional relationships. These competencies should be able to adapt to local circumstances, whilst also utilising global knowledge and experiences (Frenk et al. 2010). A number of potential target areas for post-qualification training are identified below.

3.4.1.1 HRH and systems management competencies

Interventions to strengthen health workforce management can have multiple downstream impacts improving health worker performance and retention. Attention has been drawn to inadequacies in the management of human resources, and there are significant needs for capacity building in this area (Fritzen, 2007). Two examples of collaborative and distance-taught Masters of Public Health programmes with a focus on health workforce development were initiated in 2009 and 2010 with the support of WHO and the Bill and Melinda Gates Foundation (World Health Organization, 2010b, World Health Organization, 2010a). These programmes build on existing Masters of Public Health programmes offered by lead institutions by introducing specialised courses on health workforce development and management (see case study: University of the Western Cape: Masters in Public Health).

3.4.1.2 Procurement and supply chain management competencies

One area of need which appears to be largely unmet by formal post-qualification programmes is that of procurement and supply chain management of medicines, vaccines and health technologies. While there are examples of relevant programmes available, such as The University of Dundee's BAPD, delivered to health workers in Eritrea and Botswana, various publications have observed competency gaps in procurement and supply chain management (Waako et al., 2009, Matowe et al., 2008, Woodle, 2000). Strategies to develop human resources in this area include short courses, on the job training, supervisory strategies as well as regional capacity building collaborative, though it seems that there is scope for structured education programmes in this field (Waako et al., 2009, Matowe et al., 2008, Woodle, 2000).

3.4.1.3 Educator competencies

Medical education is essential to the development of the healthcare workforce, and operates as an integral part of human resource plans (Mullan et al., 2010a). The response to the health workforce crisis in many LMICs has been to scale up the domestic production of health workers. With the scale-up of pre-service and postgraduate health worker programmes, there is an increasing demand for health workers with educator competencies and post-graduate qualifications. This need is made all the more urgent with the ageing demographic of academics that are soon to retire. Limited investment in capacity in recent years has meant that for many universities, there is a lack of mid-career academics.

As further evidence of this, a recent UNFPA study identified a lack of midwife teachers in LMICs, and limited training of midwife teachers on competency-based training approaches, pedagogies and training technologies (Unfpa, 2008). A commentary on the development of pharmacist education in seven African countries described academic workforce shortages as one of the pressing barriers to scale-up of the training programmes (Anderson et al., 2008). A 2007 study mapping advanced public health education capacity found less than 500 full-time and 360 part-time staff in institutions (Ijsselmuiden et al., 2007). Postgraduate public health programmes existed in less than half of the countries in Africa at the time (24/53 countries), with the greatest shortage of staff and programmes in lusophone and francophone Africa (ibid.) Sixty percent of the institutions were staffed by less than 10 full-time staff members with great dependence upon part-time faculty members (ibid.). Given the growing demand for postgraduate public health education programmes in Africa, it is clear that there is a shortage of academic staff.

There are few post-qualification programmes that build educator competencies in health workers, this often being a neglected or ad hoc area of development. The FAIMER fellowship programme and FAIMER/WFME/OU DL resources for medical education programme series are some of the available programmes designed to build the competencies of academic faculty (Owen, 2010, Burdick et al., 2010b) (see Case study: FAIMER: Fellowship in Medical Education).

3.4.1.4 Researcher competencies

Various articles cite the need for capacity development of research skills amongst health workers to integrate operational research into practice and stimulate an evidence-based approach to health care development and evaluate the impact of interventions (Edwards et al., 2009). There is significant demand for large scale operational research training delivered through formal post-qualification distance education programmes. Additionally, beyond the creation of new heath knowledge, research opportunities are also seen as important for the retention of health workers and the strengthening of the health infrastructure, in that it attracts funding and investment (Mullan et al., 2010a).

3.4.1.5 Primary healthcare competencies

Over 30 years since the Alma Ata declaration, LMICs have used the primary healthcare approach to strengthen health systems, improve efficiencies in health services and improve health outcomes (Kruk et al., 2010). However, shortages of health workers to provide primary healthcare services exist and there is a lack of competencies of existing health workers in primary health care, underscoring an urgent need for development of these skill sets. The advantage here is that these competencies can be developed by health workers such as community health workers, private pharmacy and drug store workers, in addition to nurses, clinical officers and physicians. However, while such cohorts are often provided with training through pre-service training programmes, the requisite specialities associated with primary healthcare delivery might benefit from enhancement and improvement through post-qualification training programmes.

3.4.1.6 Advanced medical specialist competencies

A 2009 review of paediatric emergency and critical care in low income countries identified major training requirements including seeking and documenting clinical features, basic critical care management competencies as well as supportive tools such as triage systems, guidelines, references and protocols (Baker, 2009). Infrastructure investments such as oxygen concentrators are also required to support capacity development of emergency services. For example, the shortage of surgical personnel has been identified in low income countries such as Uganda (Ozgediz et al., 2008), and postgraduate surgical training programmes are often small scale with limited numbers of trainees per year. As a result, those seeking specialist post-qualification training may need to travel abroad due to a lack of training opportunities in the country unless a programme of DL can provide the requisite inputs.

3.4. Conclusions

Health systems strengthening relies on investment in a number of health systems building blocks, including: service delivery; the health workforce; information; medicine; vaccines and health technologies; financing; and leadership and governance. Investment in these building blocks takes a number of forms, of which human resources training forms just one element. However, in providing training that contributes to health systems strengthening, there are a number of priority areas for health worker competencies in LMICs. These include: HRH and systems management; procurement and supply chain management; education and training; research; primary healthcare; and advanced specialist medical competencies.

Section 4: Approaches to addressing health worker competency needs

4.1. Introduction

Section 3 highlighted the importance of a holistic approach to health system strengthening, reliant on parallel investments in managerial systems and procedures, in resources such as medicines and technologies, in research and information-gathering systems, and in various other inputs. Health worker training should only be seen as one strand of overall investment, and not the sole solution to addressing health systems capacity needs. However, in terms of health worker development initiatives designed to help address health systems needs, the section also identified priority areas for post-qualification training, including HRH and services management; procurement and supply chain management; education and training; research; primary health care; and advanced medical specialties.

This section describes in more detail the role that health worker development strategies, and post-qualification training in particular, can play in addressing current competency priorities. It provides a summary of general strategies for the development of health worker competencies, and, drawing on the available evidence base for identifying the impact of health training inputs, will provide an overview of the various education and training interventions that are seen to contribute towards the enhancement of health worker performance and the attainment of wider health outcomes.

4.2. Systemic strategies to develop required health worker competencies

There are certain approaches that health worker development strategies, including post-qualification training, particularly for the priority competencies identified in Section 3, can seek to accommodate as a means of improving health worker performance.

The 2006 World Health Report advocates a 'working lifespan' approach that considers each stage of a health workers career. Health worker development strategies should seek to fulfil two concurrent priority needs, first, to scale up competent health worker capacity to equitably respond to health needs, and second, to institutionalise the performance of health workers to ensure quality and efficient health services (World Health Organisation, 2006).

The ability to respond to health needs and the institutionalisation of performance both require a comprehensive understanding of the systemic dynamics and factors that influence competencies, and mechanisms allowing the translation and application of acquired competencies for use within a specific health context. However, in the design of capacity building strategies to provide these, assumptions are often wrongly made that investments in the development of competence in these areas (especially through training) will automatically result in improvements in health worker performance and thus health outcomes (Potter and Brough, 2004). Growing evidence points to the need for training interventions to be supported by strategies to reinforce behaviour change, recognise performance and ensure both conducive working environments and the availability of required tools in order to ensure change (Haines et al., 2004).

Potter and Brough's framework, describing a hierarchy of needs for systemic capacity, argues that initiatives focusing on the development of skills and tools cannot be effective without addressing the underlying structures and systems and adequate human resources and facilities (Potter and Brough, 2004). This reinforces the point that certain conditions need to be present before training inputs can contribute in the facilitation of performance institutionalisation. Bearing this in mind, it is important to note that observations regarding the enhanced potential that DL offers as a training mechanism for facilitating work-based and community-based

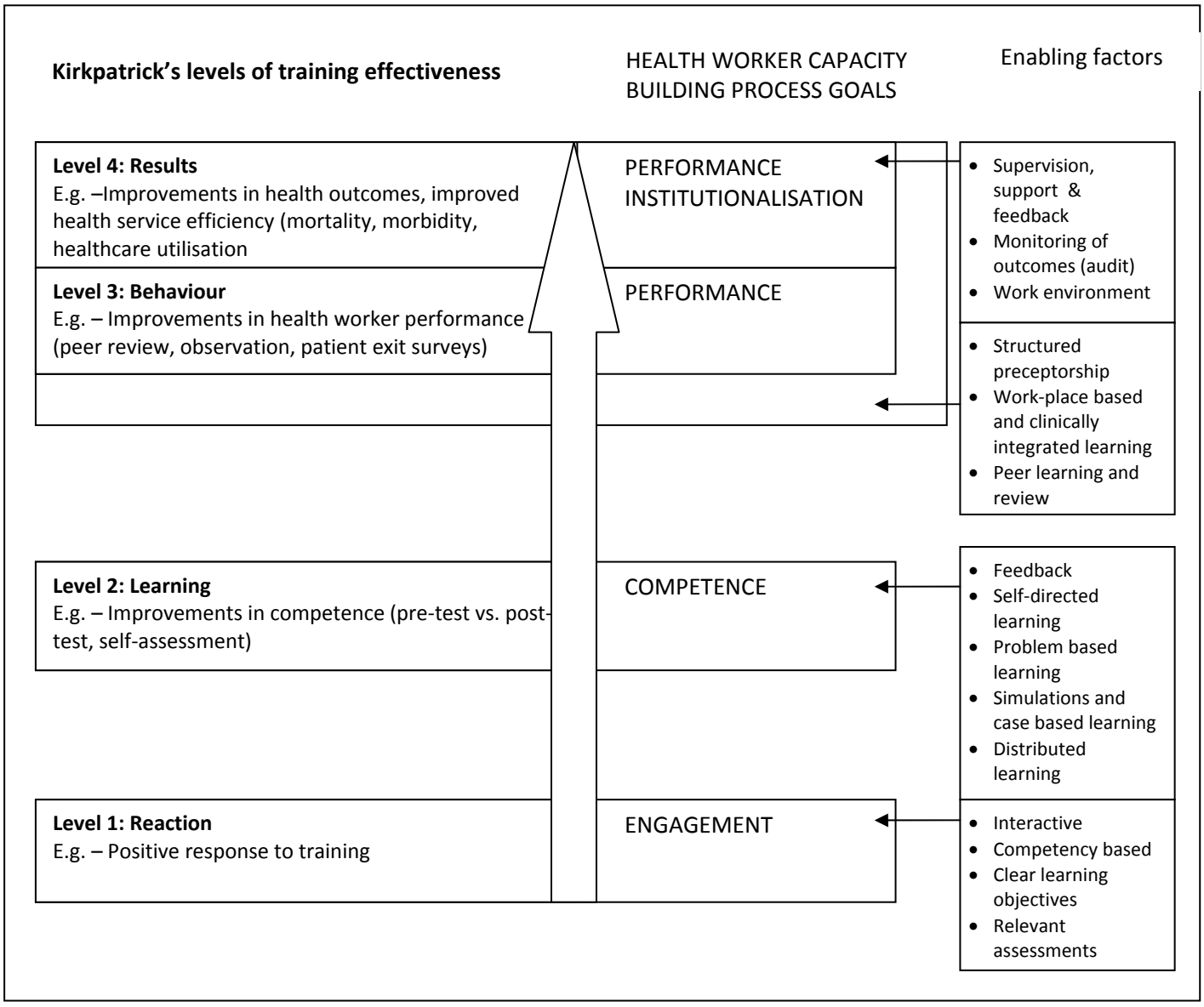
learning need to be tempered by a recognition of the importance of other systemic work-based factors in enabling this, such as: supervision, support and feedback; monitoring of outcomes; and an enabling work environment.

4.3. Strategies in training for the improvement of health worker performance

Taking into account the systemic factors outlined in Section 4.2., there are a number of ways in which their contributions to health worker performance enhancement can be formalised within the training process.

Figure i. (below) describes the progression from health worker engagement in training, to competence, performance and performance institutionalisation. This is a conceptual framework of health worker capacity building based on the Kirkpatrick Model for Evaluation Effectiveness of Training Programmes (Kirkpatrick and Kirkpatrick, 2006), which outlines the training approaches seen to best contribute to improvements in health worker performance. Within this framework, it should be noted that post-qualification distance education is represented as an opportunity to attain comparable effectiveness in training health workers to that of other modalities (Cook et al., 2008a, Cook et al., 2010a).

Figure i: Health worker capacity building for health systems strengthening



In the Kirkpatrick Model, the first level of training effectiveness is to achieve a positive response from the learner, otherwise seen as learner engagement with the training process. This builds the foundation for improved training effectiveness, but is not sufficient on its own to enable the development of health worker competencies and improve performance. Various strategies described in the literature that have been demonstrated to improve learner engagement include the use of components of interaction between learner and teachers and between learners.

Secondly, competency-based education allows for an individualised learning process, where learners have the opportunity to explore a range of options and, through application, select those that best apply according to their own needs and contexts (Frenk et al. 2010). A competency-based approach to curriculum development, coupled with clear learning objectives, can focus the learning process towards developing specific competencies. In particular, modes of assessment related to competency development needs are important means of improving performance.

Thirdly, in order to build health worker capacity for health systems strengthening, health worker training should be supported by strategies to enable behaviour change for the institutionalisation of improved performance (Cook et al., 2010c). The MACH (Miner, Alperin, Cioffl and Hunt) model describes the development of competencies and performance in the public health workforce through organisation and instructional theories, and distinguishes between two types of capacity development needed before performance can be improved. The first type is described as competency deficiencies, which can be addressed through training. The second type is described as work environment deficiencies, which require management and organisational development (Miner et al., 2005). The scenarios frequently associated with work environment deficiencies are commonplace in many LMICs (Wiskow et al., 2010). There is evidence to support the MACH model, with various reviews finding that, whilst training may address competency deficiencies, it does not necessarily translate into effective performance in the health system or improvements in health service delivery or health outcomes.

With this in mind, the evidence base does advise that training programmes should take into account the equal importance of the work environment as an enabler of improvements in health outcomes and to address them accordingly. Supervisory support and integrated learning situated in the workplace has been associated with improvements in performance, together with feedback and the use of audits. In order for health training programmes to have an impact on learners in terms of both the attainment of competencies and the application of these through behaviour change, they require:

- significant components of field-based training – approximately 80%;
- a supportive working environment, as demonstrated with work-based mentor and preceptor schemes;
- learner involvement in the work-based decision-making process;
- modes of assessment that expect direct engagement with working procedures (Wuliji, 2010).

In general terms, this fits with the systems-based process of health worker training that enables the training to improve the performance of health systems by adapting core professional competencies to specific contexts, while drawing on global knowledge to support the process (Frenk et al., 2010). To assist in facilitating the availability of these components in the workplace and as a means of improving training effectiveness, health worker training programmes should consider packaging units of self-study alongside complimentary upgrades for staff involved in the co-ordination and delivery of components of workplace learning and/ or work-related engagement.

To illustrate how this dual approach might be applied in practice, a recently documented example of using various levels of post-qualification training as elements in a mix of approaches for strengthening health services provision is the Diabetes UK Twinning Programme, implemented between 2003 and 2009 in Mozambique (Beran et al., 2010), which was used to strengthen national capacity for diabetes care. This programme trained 265 health workers in all provinces, developed patient education materials, expanded public awareness activities and strengthened the diabetes association resulting in an eight-fold increase in professional membership (ibid.). Post-qualification train-the-trainers programmes were also conducted to

capacitate local faculty to offer training for health workers at different levels of the health system. The proportion of health workers that reported receiving specialised post-qualification training in diabetes increased from 52% in 2003 to 65% in 2009. A postgraduate training course for medical students was established following a need identified in the 2003 assessment through a survey of medical students. Diabetes UK used existing needs assessment tools to develop strategies and implemented them in collaboration with local partners.

4.4. Training modalities and approaches for the improvement of health worker performance

This sub-section describes the available evidence base related to the specific education and training modalities and approaches seen to improve health worker performance and wider health outcomes. 'Modalities' refers to the various components through which the training is delivered, and 'approaches' refers to the teaching and learning processes employed during each component. Under 'modalities', the work environment is also described, since this impacts on the delivery process, and, as outlined in Section 4.3., is regarded as a necessary factor in facilitating the behaviour change required to achieve improvements in health worker performance and wider health outcomes. It is important to note that the various elements described under both modalities and approaches should not be regarded as mutually exclusive, and in practice there is significant overlap between them, as Section 7 will demonstrate.

4.4.1. Training modalities and the improvement of health worker performance

4.4.1.1. Classroom-based learning

Whilst there is no published analysis of classroom-based certified post-qualification health worker training programmes, this likely forms the mainstay of post-qualification health worker training globally. Given the option for either self-study, work-based learning, or classroom based learning, some learners may still prefer classroom based approaches. For example, enrolled nurses in Kenya can participate in the nursing upgrade training supported by AMREF via distance education, but the option for face-to-face learning through satellite learning centres are still popularly subscribed to (note: see Case study; AMREF, Nurse upgrading programme). Most postgraduate university-based Masters degrees for health workers in LMICs are attained mainly through participation in classroom based programmes, though there is an increasing trend towards DL modalities (see Section 7.3).

4.4.1.2. Workplace-based learning

Workplace-based learning has been employed to integrate learning into real life scenarios to improve performance. This model could be applied to any set of professional knowledge, skills or competencies and the examples are diverse, ranging from management to clinical skills to field epidemiology. As health worker training tends to be for applied competencies, workplace-based learning is particularly suited for the development of such competencies.

Workplace-based learning can be seen as a form of blended learning that provides learners with the opportunity to contextualise and apply learning while also undertaking units of self-study. From a systemic perspective, this can result in reduced disruption to work patterns, as learning activities are supported in the field or workplace and do not exclusively involve prolonged absence to attend classroom based activities. As an example of this approach in action, the experience in Liberia with running a six-month training programme on health facility management found that short courses at regular intervals not only reduced disruption to health facilities, but also allowed time for field-based learning that supported participants to apply their learning to specific problems in their work environment (Rowe et al., 2010). However, it should be noted that workplace-based learning requires high quality field supervision and committed support from practice and field sites, which may require prior investment in order for this approach to succeed. The sustainability and institutionalisation of workplace-based learning is another major challenge, given its reliance on field and workplace learning sites to provide supportive and enabling learning environments.

Further examples of workplace-based learning include is the Field Epidemiology Training Programme (FETP) approach of learning by doing which has been applied to training field epidemiologists in Central America (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua) and the Dominican Republic since 2000 and Africa (Burkina Faso, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, South Africa, the United Republic of Tanzania, Uganda and Zimbabwe), starting in Zimbabwe in 1993 and Uganda in 1994 (Lopez and Caceres, 2008, Mukanga et al., 2010). This competency-based programme is comprised of three tiers – basic, intermediate and advanced – and is structured to support individual career advancement while also strengthening support through the provision of cascade mentorship at each level. Completion of the intermediate level programme leads to the attainment of a diploma and the advanced level programme results in a Masters of Public Health. Roughly 80% of the learning activities throughout the programme take place in the field with only 20% held in the classroom. The approach of learning by doing has also meant that trainees in Latin America have developed epidemiological activities as part of their training, leading to 181 evaluations of surveillance systems, identification and investigation of 222 outbreaks and 167 research studies and first response to natural emergencies (Lopez and Caceres, 2008). In addition, around 80% of graduates of the programme in Latin America were found to be working within the Ministries of Health indicating successes in supporting the retention of graduates. A recent retention study of the programme graduates from Uganda and Zimbabwe found that 85% of graduates remained working in-country (Mukanga et al., 2010). These high rates of retention are thought to be due in part to the programme's contribution to the well defined career pathways of graduates, and to the competence-based approach to training, placing a skills focus on application in the field. Work-based learning has also been used for a post-qualifying course on rehabilitation for nurses in the UK (Owens and Rutherford, 2007).

Within the context of workplace-based learning, the limited literature on health worker training effectiveness has identified the empiric value of the principles of 'contextual learning' and 'actualisation of the result of learning' (Zmeyov, 1998). Such theoretical approaches are often associated with the educational principles of andragogy, which is discussed in Annex 4. As examples of the benefits of this approach, positive effects of emergency obstetric care training programmes were found to be associated with hands-on or applied modalities, team approaches and follow-up training (van Lonkhuijzen et al., 2010). In one example, performance improvements in aseptic insertion techniques and maintenance of central venous (CV) lines was found to be associated with repeated sessions integrated into daily work (Cherry et al., 2010).

Project based learning, as applied to faculty development of health worker educators through the FAIMER Fellowship programme, the Management Sciences for Health Virtual Leadership Development Programme, and through the CMC Vellore Fellowship in HIV Medicine, is another form of workplace based learning that can improve educator and institutional performance. The FAIMER programme reports that over half of all programme projects lead to changes in curriculum and institutional policy (Burdick et al., 2010a).

4.4.1.3. Community-based learning

Community-based learning as a modality places particular emphasis on providing health workers with the competencies to address community health needs, as determined by local cultural and contextual factors. Provider institutions are increasingly emphasising community-orientated, locally relevant or nationally focused education for health workers: a survey of 96 medical schools in sub-Saharan Africa revealed that 83 used community-based learning 'frequently/ extensively' in clinical rotations, and 52 used it 'frequently/ extensively' in pre-clinical courses (Mullan et al., 2010b, Mullan et al., 2010a). This is being done by developing curricula around national priority health problems, often drawn from identified government priorities and national service programmes (ibid. p6). Rural and community-based experiences are used to improve the delivery of their programmes, and utilise workplace-based learning components which specifically take place at field sites including district hospitals, community health centres, clinics, and patients' homes (ibid.). At Gezira University, Sudan, 25% of study is made up of community-based learning components (ibid.).

Structured community exposure and community-based education provides learners with experience working with under-served populations and improves their preparation to deal with national health priorities (ibid. p7).

In some cases from sub-Saharan Africa, community-based learning combined with structured evaluation techniques has led to high satisfaction among learners, together with lower attrition rates, and greater perceived ability to function in rural communities. However, as a mode of delivery in LMICs, it can suffer from constraints due to unreliable public services and utilities, language barriers at some rural sites, and challenges in maintaining high educational standards with community physicians who supervise learners. While the educational superiority of such approaches as compared to traditional campus-based modes is difficult to demonstrate, at least one study comparing senior students and recent graduates from CBE curricula with those from traditional curricula showed greater sensitivity to community health needs by the former as opposed to individual health needs by the latter (Mullan et al., 2010b, Mullan et al., 2010a).

4.4.1.4. Distance learning

Evidence shows that post-qualification distance education, as supported by electronic and Internet-based mediums and simulations, represent opportunities to attain comparable (though not necessarily superior) effectiveness in training health workers to that of other modalities (Cook et al., 2008b, Cook et al., 2010a). A meta-analysis in 2008 of health professionals Internet-based learning found large positive effects from e-learning activities compared to non-intervention control groups, but mixed and limited positive effects in comparison to groups receiving similar training through other methods (Cook et al., 2008b). Much of the evidence supports the conclusion that DL (often also stated as e-learning) can be considered to produce comparable, but not necessarily superior effects to that of traditional classroom learning methods (Hugenholtz et al., 2008, Wutoh et al., 2004, Cook et al., 2008a, Chumley-Jones et al., 2002, Olmsted, 2002, Garland, 2010).

However, DL is in a good position to consider design features demonstrated to improve practice such as workplace-based learning, interactive and clinically integrated learning, applied or simulated learning, and interdisciplinary education. DL approaches can also be packaged with other interventions that improve and maintain performance of health workers such as feedback, audit, supervision and improvements in the work environment. Multiple interventions likely to be more effective than stand-alone interventions (Rowe et al., 2005).

4.4.1.5. Work environment

A recent WHO report states that 'an attractive and supportive workplace can be described as an environment that attracts individuals into the health professions, encourages them to remain in the health workforce and enables them to perform effectively' (Wiskow et al., 2010). An enabling working environment is also important to allow newly acquired competencies to be put into practice and the influence of resources, equipment and infrastructure on performance should not be underestimated (Wiskow et al., 2010, van Lonkhuijzen et al., 2010). The MACH (Miner, Alperin, Cioffl and Hunt) model describes the development of individual competencies and performance in the health workforce and through organisation and instructional theories, and recognises that work environment deficiencies, requiring management and organisational development, need to be addressed in order that training designed to address competency deficiencies can achieve effectiveness in health workers performance improvement (Miner et al., 2005).

Work environments have also been identified as an important factor influencing recruitment and retention of health workers as well as the quality of care. Recommended policy options to improve work environments include improving the work-life balance, promotion of family friendly workplace options (such as flexible working time), improving health protection, implementation of occupational safety and health management systems, and use of workplace assessment programmes (Wiskow et al., 2010). Clearly there is a need for supportive strategies that encourage retention of health workers otherwise gains from education and training will be potentially lost. In one programme, the retention of doctors trained through rural practice orientation modules was supported by non-financial package, improved quality of life and working conditions (Van Dormael et al., 2008). In addition to increasing salaries, physicians have also cited improving living and working conditions, bettering career development, and expanding educational opportunities for their children as important goals to retain doctors in rural settings (Mullan et al., 2010a, Mullan et al., 2010b).

4.4.2. Training approaches for the improvement of health worker performance

4.4.2.1. Interactive and clinically integrated learning

Interactive learning refers to teaching and learning components that involve some form of interaction between participants such as case discussions, practice and application of skills, or role plays (73). The case for applied and interactive learning is supported by a review which found that teaching and learning methods that actively involved learners interacting with learners in a clinical environment were theoretically and empirically superior in their educational effectiveness as compared to either classroom based activities and/or didactic activities (Khan and Coomarasamy, 2006). Likewise, a 2001 Cochrane review on the effect of continuing education meetings and workshops identified moderate to moderately large effects of interactive workshops, whilst no statistically measurable effects were observed in purely didactic presentations (O'Brien et al., 2001).

Khan and Coomarasamy (2006) proposed a three-tiered hierarchy for teaching and learning evidence-based medicine. In terms of impact on health worker performance, this hierarchy rated interactive and clinically integrated activities the highest (level 1), followed by interactive classroom activities or didactic and clinical integrated activities (level 2), and finally, didactic, classroom or stand alone educational activities (ibid.). In support of this model, their review identified that seven out of eight published evaluations of interactive educational activities were associated with improvements in practice, whilst in six out of seven Randomised Controlled Trials (RCTs) of didactic education activities found no significant differences between groups (ibid.).

From a practical perspective, health worker training is very much applied and so the skills sets associated with health worker training are associated with interactive learning. It offers a mode of exchange that is very similar to the work environment, in that it requires health workers to interact with other team members and patients. Team-based learning is frequently employed in preparing learners for effective, collaborative work within a cohesive group (Frenk et al., 2010), and has growing popularity in sub-Saharan Africa: in a survey of 99 medical schools from across the continent, 72 reported using team-based learning 'frequently/extensively' in clinical rotations, and 47 reported using it 'frequently/extensively' in pre-clinical courses (Mullan et al., 2010b).

4.4.2.2. Interdisciplinary education

Interdisciplinary learning 'aims to encourage different professionals to meet and interact in learning to improve collaborative practice and the health care of patients/clients' (Reeves et al., 2008). Interdisciplinary exchange, as well as multi-professional training that allows groups of health professional to learn and work together in teams, have proved useful in preparing learners for new or expanded roles and responsibilities in the workplace (World Health Organisation, 2009b). However, there are difficulties cited in facilitating interdisciplinary learning and exchange through the team environment, on the basis of professional hierarchies, over-specialisation among certain disciplines, and issues with professional accreditation of collaborative activities (Frenk et al. 2010 p. 1944).

Despite this, there is growing interest in using interdisciplinary education as a means of strengthening relationships between health professional groups, fostering health care team approaches, and improving collaborative practice competencies. This interest is built upon the assumption that interdisciplinary education prepares health workers to be collaborative practice-ready, and that this in turn prepares them to be better equipped to meet local health needs in the most efficient and effective manner (Health Professions Networks, 2010). From a systemic perspective, the promotion of inter-professional education and training serves to break down professional barriers between disciplines, while enhancing collaborative and non-hierarchal working relationships within effective teams (Frenk et al. 2010 p1951). In particular, it can be used to enhance competencies in leadership and management, analytical skills, and communications. Examples of interdisciplinary education described in a recent Cochrane review include communication skills training for physicians, physician assistants, nurse practitioners and optometrists; collaborative skills of emergency department physicians, nurses, technicians and clerks; training on recognition and management of depression in primary care settings by physicians and practice nurses; management of domestic violence in primary care clinics by physicians, nurses, physician assistants, medical assistants; and improving the mental health management competencies of psychiatrists, nurses, therapists, case managers, residential staff and

administrative support personnel (Reeves et al., 2008).

This Cochrane review of the impact of interdisciplinary education interventions on practice and health care outcomes identified four Randomised Controlled Trials (RCTs) and two Controlled Before and After (CBA) studies over the period 1999 – 2006 that met their criteria (ibid.). These studies have generally indicated positive outcomes associated with interdisciplinary education; such as improved patient satisfaction, collaborative team behaviour, and quality of services as well as reduced clinical error rates. Some studies reported a mix of neutral and positive outcomes as well as no outcomes (ibid.). However, these studies compared inter-professional education interventions against no intervention and had small sample sizes, thus conclusions regarding the added value of different types of interdisciplinary approaches to education and training cannot be made with certainty (ibid.).

4.4.2.3. Applied simulated and/or virtual learning

The use of simulated patients or computerised virtual patients presents learning opportunities for health workers to develop and improve skills in an environment that promotes the continuous improvement of cognitive skills such as clinical reasoning and patient communication, but without exposing patients to the potential risks of learner errors. Simulated or virtual approaches may have the added advantage of being cheaper than traditional approaches; improving learner independence; and presenting increased opportunities for skills development. However, despite the value of virtual or simulated pedagogies in building competencies, they are not appropriate replacements for real-life interactions and may not adequately represent complexity of real-life interactions (Smith et al., 2007, Wiecha et al., 2010).

A recent systematic review and meta-analysis of 43 studies on the use of computerised virtual patients in health professions education found that the use of such tools resulted in improving the learning outcomes compared to non-intervention control groups, but found limited or no additional improvement on learning outcomes over and above non-simulation approaches (Cook et al., 2010a). Learning outcomes using computerised virtual patients can be further improved through incorporating individual and group opportunities to repetitively practice skills to required performance standards, ensuring high levels of feedback to learners, and use of a diverse set of realistic simulated cases or scenarios (ibid.).

4.4.2.4. Feedback and supervision

In both theoretical and applied contexts, evidence shows that learners need ongoing feedback and supervision to enhance their learning outcomes. Feedback and supervision has been repeatedly cited in the literature as an important requisite for improvements in health worker performance (Horwood et al., 2009, Dieleman et al., 2006, Cook et al., 2010a, Chaudhury et al., 2005). This can take place in the form of structured supervision and teaching in preceptorship or clinically supervised practice, or as a general part of organisational performance management and mentorships in health facilities via peer or hierarchical mechanisms. Supervision and supervisory visits, peer review and continuing education may reinforce performance over time (van Lonkhuijzen et al., 2010). Feedback and audit has been found to have small to moderate effects on practice (Jamtvedt et al., 2006).

It is common practice in most countries for health workers to undergo a mandatory period of formal experiential learning, often supervised by an experience practitioner or 'preceptor' before qualifying to function independently. Reviews of preceptorships or clinically supervised practice across health professions training identified the importance of the relationship between the preceptor and learner for supervision effectiveness (Billay and Yonge, 2004, Kilminster and Jolly, 2000). Both reviews also cited the need for the selection of appropriate evaluation tools and techniques to assess learner performance and for adequate preparation and recognition of preceptors to strengthen outcomes (ibid.; ibid.).

A 2007 Cochrane review of 118 studies reporting the effect of audit and feedback on professional practice and health care outcomes found small to moderate effects on professional practice with greater gains in scenarios with low baseline practice standards and with more intensive feedback (Jamtvedt et al., 2006). These effects were not always observed consistently which suggests significant heterogeneity in the mechanisms through

which audit and feedback may be conducted as well as other interventions and enabling factors which may limit or maximise impacts (ibid.).

4.5. Conclusions

For best improvements in health worker performance, health worker training needs to take place in an enabling work environment, and if the requisite elements are not present in the work environment, than training programmes need to consider the means by which they might be development. In addition, training programmes should also endeavour to formally incorporate those elements within the teaching and learning process, including mechanisms for work-based learner support, peer-to-peer interaction, and application of skills. The range of training modalities that are seen to assist with facilitating this include workplace-based learning, community-based learning, and DL that features applied study components. Particular approaches that contribute to the teaching and learning process in such setting include: interactive learning; clinically integrated learning interdisciplinary learning including teamwork and project-based activities; feedback and supervision; and in certain context, simulated learning and / or virtual learning activities.

Section 5: An overview of distance learning and distance learning for health

5.1. Introduction

This section opens with a basic overview of DL, providing a summary of the main themes surrounding its application. This is followed with a basic history of the development of DL in the training of health workers. This section concludes with a summary analysis of the contribution that DL can make to existing strategies for enhancing health worker performance.

Various terminologies are used to describe study-at-a-distance. 'Open learning' has been defined by Perraton as: 'an organised educational activity, based on the use of teaching materials, in which constraints on study are minimised either in terms of access, or of time and place, pace, methods of study or any combination of these' (Perraton, 1983). Elsewhere he defined 'distance education' as: 'an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner' (ibid.). The two terms are often used interchangeably, though it is recognised that 'open' implies a philosophical approach while 'distance' is about methodology. These two definitions are applied throughout this paper, and they are usually used together under the generic phrase 'DL'.

For a general introduction to the history of DL, and a summary of current trends in DL, please see Annex 2.

5.2. Approaches to utilising distance learning

As a mode of educational delivery, DL offers a number of advantages, widening access to quality education and increasing opportunities for teaching and learning provision. In particular, factors such as physical distance and time, which can be barriers to learning in conventional campus-based settings, are partially overcome through the application of DL methodologies. However, there are certain prerequisites and design considerations that need to be addressed in order to ensure a standard of educational quality, and these can place demands upon those education and training systems that wish to use DL methodologies. This sub-section provides an introduction to the educational contexts in which DL can assist, and highlights a number of the key issues that need to be taken into account by those considering the application of DL approaches in training provision.

5.2.1. Addressing contextual circumstances through the application of distance learning

DL can be valuable in addressing the following situations in education and training.

5.2.1.1. Overcoming physical distance

DL enables educational opportunities to be made available much more widely than traditional campus-based programmes (Dodds, 1972). It can reach learners in remote locations unable or unwilling to physically attend a campus, and can provide educational opportunities where learners and teachers are geographically separated.

5.2.1.2. Accommodating individual time limitations and scheduling problems

DL can work to serve learners who are either unwilling or unable to assemble together frequently due to their external commitments. This would include, for example, learners engaged in full-time or part-time work and those with family and community commitments. It is partially for these reasons that many DL programmes involve part-time rather than full-time study.

For these same reasons, DL is seen as greatly facilitating on-the-job training. Firstly, students do not have to leave or take leave of absence from their jobs in order to study, and secondly, the programme of study can be used to make explicit links between the learning process and its application to day-to-day professional experience (Commonwealth of Learning, 1997).

5.2.1.3. Expanding the limited number of places available through conventional campus-based education

Out of necessity, educational systems that rely on conventional campus-based institutions will place limits on the numbers of learners who can access education. Firstly, there will only be a finite number of educational institutions and secondly, each institution will only have a fixed capacity in terms of numbers who can be accommodated and educated on-site. In response to this, many institutions may apply stringent entrance requirements and attendance fees as a means of limiting potential enrolments as well as maintaining high academic standards.

By engaging with an audience of off-site learners, DL is able to overcome the logistical constraints of campus-based education. The Open University of Sri Lanka is an example of an institution designed to increase access to university education in a country where the number of places available at conventional universities is very limited. In addition, partially because of the reduced constraints on numbers, distance education programmes are able to both lessen the entrance requirements, and also offer lower enrolment fees. This, combined with the reduced personal cost to the learner in terms of relocation, serves to expand access to education for those with otherwise limited opportunities for educational engagement through conventional means.

5.2.1.4. Making best use of the limited number of educators available

In addition to its potential to overcome limited institutional capacity, DL can also provide teaching and learning opportunities in circumstances where there is a lack of appropriate expertise or trained teaching personnel relative to demand. This can be particularly the case with specialist and technical subjects, or in low-resource settings, where educators with certain expertise are in short supply. In addition, DL can also enable the use of the very best educators in particular subjects to contribute to teaching and learning for students in areas where access to such quality by traditional means would be severely limited. The value of such potential may be of particular relevance to health worker training in LMICs. In sub-Saharan Africa, for example, there is a noted shortage of medical institutions and faculty in comparison with the demand for trained and qualified health workers (Mullan et al., 2010a).

The same applies in circumstances where teaching personnel are geographically concentrated, as determined by the location of the educational institutions. The Open Access College, Australia, is an example of a DL institution whose placement of staff is used to reach out to ‘dispersed and isolated learners’ through the innovative use of technology (Open Access College, 2010).

5.2.1.5. Facilitating economies of scale

DL has the potential to increase access to large numbers of learners while operating in educational contexts with limited capacity or finite resources. Further to this, if used with large audiences, DL can also provide significant economies of scale.

This applies particularly in circumstances where, for example, provider institutions have a steady number of students studying the same programmes over several years. Common costs include initial development and implementation; materials production and delivery; ongoing academic, administrative and logistical support processes and so on. The costs for provision of such services are reduced when programmes are provided to large and repeated intakes of learners. In the appropriate circumstances, these costs can be much lower than when delivering the same programmes of study to the same number of students on a repeated campus-based basis (Perraton, 2007). In such cases, this can see a model of delivery where DL modes are used as a supplementary ‘extension’ to pre-existing campus-based programmes (Joynes, 2010).

5.2.1.6. Supporting programmes with low and/or dispersed enrolments

In addition to the above, DL may be an effective mechanism for institutions seeking to improve the cost-effectiveness of programmes with low levels of enrolment either on-campus or within a limited geographic region. In addressing issues of learner quantity through DL, programmes with low core enrolments may supplement their body of learners through accepting additional enrolments from a broader geographical spread.

5.2.2. Pre-requisite activities in the implementation of distance learning

The application of DL can make substantial demands on the training systems in which it is applied. Unless these demands are taken into consideration and addressed during the development and implementation process, it can have serious ramifications for the success or otherwise of DL application. Below is a summary of the main issues that need to be addressed in the utilisation of DL methodologies.

5.2.2.1. Responding to the needs and circumstances of the learners

At the most basic level, responding to the needs and circumstances of distance learners involves putting in place teaching and learning components and delivery mechanisms that address the unique academic circumstances facing distance learners. In the first instance, the factors for consideration include:

- ***Overcoming the effect of learner isolation***

By its nature, DL places the learner at a distance from the institution, the teacher and often their peers. One of the great advantages of conventional campus-based or face-to-face education is the continuous interaction between students, their teachers and peers. This is further supplemented through access to a range of on-campus educational resources and facilities. All of this serves to enhance the learning process, and to ensure a higher degree of educational responsiveness to individual learner needs.

Without careful design and planning, such elements can be difficult to replicate for learners in a DL setting, thereby heightening the sense of isolation commonly felt by distance learners. In addition, distance learners are often part-time students, undertaking study at unsocial hours or in tandem with professional or family commitments. These pressures can make it hard to maintain commitment and motivation, and frequently result in high levels of dropout among distance learners.

Programme providers need to take such issues into consideration when designing the range of teaching and learning components that will make up a DL programme, and ensure that the various pressures on learners are addressed or accommodated through instructional design, scheduling, and contact mechanisms.

- ***Providing substantial learner support mechanisms***

In order to address the sense of isolation felt by many distance learners, and thereby going some way to reducing the high levels of dropout or non-completion that occur on DL programmes, it is necessary for institutions to put in place suitable learner support mechanisms. These support mechanisms usually cover a range of activities including academic, administrative and logistical tasks. Each of these can involve complex systems of coordination and follow-up in order to ensure they are delivered in a timely and effective manner. The tutors and programme developers themselves may also be placed at a distance from the institution, thereby requiring additional layers of administrative support and coordination.

As such, DL delivery can place greater demands on institutional capacity than would occur in a campus-based programme, in terms of the design, implementation and funding of support service provision. It is important that the delivery costs of such activities are not underestimated, or that their importance in ensuring programme effectiveness is not ignored. Learner support remains absolutely central to the successful completion of training at a distance.

- ***Considering wider implications of learner needs and circumstances***

In addition to providing the basic forms of service identified above, there is a need to consider the broader ramifications that learner needs and circumstances hold. As the above indicates, addressing these can place additional resource demands on programme providers. Further to this, there is a need to consider how educational programmes will be funded and whether people can afford to take part in them. Evidence from India and from Chile of programmes for upgrading teachers' skills provide examples of programmes in which the rewards were not guaranteed, but there were considerable demands on learners in terms of time, as well as money for tuition fees. Dropout rates were high (Perraton, 2001). More recently, online students in Kenya on a Sunderland University Masters course in computer science were travelling considerable distances to the Jomo Kenyatta University of Agriculture and Technology campus in Nairobi in order to get computer access that was otherwise prohibitively expensive in cybercafés (Perraton, 2010).

For a further discussion of issues to consider with regard to identifying learner needs and requirements, see Annex 5.

5.2.2.2. Investing in formative research and evaluation

The value of having a thorough picture of learner needs and circumstances illustrates the importance of devoting resources to undertaking formative research and evaluation as a means of gathering relevant data. At the design stage, programmes must build in processes of testing and of formative evaluation in order to ensure that teaching materials make sense to potential learners, but at a wider level, it forms a prerequisite for ensuring academic relevance.

Programmes of study designed for large cohorts of learners, and accompanied by mass-produced course materials, almost by definition cannot address the individual needs of all their students through content alone. Without the adequate investment in research, and the subsequent development of responsive modes of learner support, DL programmes may present an industrial-scale model of education that is inappropriate to individual learner needs and does not address their unique context-based concerns. This is a particular concern with programmes that are delivered to a global cohort of learners, or are developed by an institution in one country and consumed by a domestic audience based in another. Further academic issues arising from this approach to delivery might include the relevance of content; teaching and learning models; accreditation; and the accessibility and usability of particular media and technology. These topics are discussed in more detail in Annexes 4 to 8.

In addressing such concerns, provider institutions need to invest in undertaking detailed needs analyses among their cohorts of learners, in order to identify the unique contextual priorities that apply in each case. As an illustration of this within the context of training for health workers, the statistics on doctor numbers and neonatal mortality demonstrate the difficulty of making simple assumptions about different national audiences: the job of being a doctor will be different in Jamaica, where there are two health workers for each doctor, than in Argentina, where there are about four doctors for each health worker (Perraton, 2010).

5.2.2.3. Investing in instructional design

Investments in suitable instructional design are central to the effective delivery of teaching and learning to the learner. It follows from the above that course and curriculum design needs to be sensitive to learners: this will pose particular difficulties for provider institutions running international programmes with dispersed and diverse groups of learners.

However, in ensuring academic relevance for diverse bodies of learners, course developers need to consider approaches to instructional design that allow for learner-led flexibility through the selection of content, modes and topics of assessment, learner-centred discussion and interaction, and so on. These can contribute to programmes whose instructional design mechanisms are adaptable to the needs and interests of learners across a range of contexts and settings. There is extensive general literature on the planning of curricula to guide this process, and which goes back to Bruner (Bruner, 1966, Bruner, 1960) and Gagné (Gagné, 1966).

In terms of the delivery of such academic inputs, there is substantial anecdotal evidence (though less solid

research evidence) to show that using a combination of media, and providing effective support to learners, will yield dividends in terms of their learning and of completion rates (Perraton, Keynote, 2010). Taking advantage of the special qualities of a variety of media, maximising the potential of each, can assist in developing unique instructional processes that in certain circumstances can be equal to or better than high-quality face-to-face instruction (Hornik, 1988).

Finally, programmes of training that utilise a range of teaching and learning components in a blended approach as part of the delivery process are more likely to support learners with a range of learning approaches. This might include combining units of self-study with media-led interventions, face-to-face support and peer-group activities. For programmes with vocational or professionally orientated objectives such as health training, work-based learning components can provide a unique range of benefits (see also Section 4).

5.2.2.4. Investing in logistical support

The procedures and mechanisms for the development and implementation of DL programmes are as central to the success of DL programmes as the teaching and learning inputs that they support. In acknowledgement of the range of systems that need to be in place as part of an effective DL programme, Hornik (1988) proposed that all those considering the application of DL as a mode of education ask themselves the question 'Will it be possible to manage the system, given available personnel and the complexity of the administrative structure?' Repeatedly, evaluations of DL programmes for teachers have found that the administrative structure for field support, for visiting teachers in their schools, and for supervising teaching practice have proved the most difficult and weakest part of the system (Lewin, 2003). John Daniel, former vice-chancellor of the Open University, argues that effective open and DL rests on three essentials: good learning materials, effective student support and efficient logistics (Daniel, 2010).

- ***Investing in specialist technical or academic expertise at the institutional level***

Fulfilling the demand for efficient logistics in DL can require not just a dedicated administrative unit to oversee a programme's development and delivery, it can also require investment in upgrading the skills and competencies of those expected to deliver materials and services. The design, development and delivery of effective DL programmes require specialist skills and expertise not necessarily widely available among traditional educators. This includes expertise in programme design and development, materials design and development, tutoring at a distance, systems design for programme administration and so on. As an illustration of this, this is a point emphasised by the practice of the Department of Health Sciences at Indira Gandhi National Open University (IGNOU), who invest substantially in the distance-related skills of academic and administrative staff (Kapoor, 2010). Again, the need for such institutional expertise and capacity may place demands on an institution that would not occur in relation to a campus-based programme. However, as with learner support, the benefits of a substantial investment in institutional expertise as part of the logistical requirements for a programme of quality should not be overlooked.

5.2.2.5. Analysing finances and budget

As highlighted above, DL frequently requires a complex range of supporting activities to ensure best quality. These include mechanisms for undertaking and administering the programme development process, materials production and distribution, learner support, assessment and accreditation and so on. Without appropriate consideration of the funding required, this can result in many hidden costs. In addition to this, there are further budgetary complexities that need to be taken into account from a financial perspective.

- ***Budgeting on the basis of high start-up costs***

While benefitting from potential economies of scale, DL programmes require substantial initial investment. This can include the costs of: staff training or consultancy fees where an institution has no existing specialist expertise; potential investment in physical and technical resources e.g. audio-video equipment, ICTs, duplication facilities etc; materials development; materials production (particularly in cases where a variety of media are used); establishment of administrative and support networks and so on.

In cases where a DL programme will be an institutional one-off or will cater for a small and specific learning cohort, the need for such investments can mean that DL is delivered at a greater cost to the institution than would an equivalent campus-based or face-to-face programme (Perraton, 2007).

- ***Considering non-completion rates when developing programme budgets***

In addition to high dropout among learners, DL often record high non-completion rates against initial enrolments, the so-called 'revolving door' effect. This can occur regardless of the levels of learner support services put in place. Perraton quotes examples of this from Costa Rica and Israel (Perraton, 2007). The difference between enrolment and successful completion rates has often significantly undermined the economies of scale that accompany most DL programmes.

Programme providers need to take such factors into account when calculating cost-effectiveness of programme investment and predicting the long-term financial viability of programmes.

5.2.2.6. Engagement of external support

In comparison with conventional campus-based programmes, DL often relies on greater levels of external support to ensure effectiveness. At the most functional of levels, the recruitment and utilisation of existing infrastructure and national networks is a common approach used by many DL programmes to assist with the range of tasks that are required to take place away from the provider institution. It is particularly common in cases where the instructional design involves modes of work-based learning or practical components. In order for this to take place, programmes clearly need to establish working relationships with the networks or institutions in question.

From an academic perspective, there is also a need to ensure that programmes are integrated with sector-wide strategies for training and development (Joynes, 2010). Educational inputs for professional development can seldom stand alone. For example, programmes for teachers on the use of computers in schools make little sense if the teachers have no access to them. Agricultural programmes about better marketing or new agricultural approaches are of little use unless the necessary inputs are there; they generally need to be integrated with the work of agricultural extension agents (Perraton, 2010). Any programme with a specific professional audience needs to engage with the wider strategies and policies associated with that sector.

Finally, in keeping with establishing working relationships with external networks, and engaging with broad training policy for particular sectors, it is necessary for those running programmes to gather and maintain political support. Without a centralised governmental support, they are unlikely to be able to mobilise the external support networks that might be required, or indeed gain the financial support that may be needed to cover the high start-up costs. But, secondly, particularly for programmes of training for professionals working in the civic sector, it is appropriate to include content designed to enhance knowledge and awareness of sector-wide policy and strategy, and to facilitate engagement with the political process. If health workers, at any level, hope to get public and political backing for what they are doing, they need to learn how best to do this (Harpenden, in Perraton 2010).

5.2.3. Summary

In summary, the points above highlight the role that distance learning can play in enabling access for learners who are otherwise unable to access mainstream educational opportunities, whether for geographic, social or economic reasons. In addition, these points highlight the role that it can play in expanding educational provision in settings where there are limited physical and academic resources. However, distance learning as a mode of study places additional academic and personal demands on the learner in comparison with face-to-face programmes. In so doing, it requires that provider institutions remain alert to the necessary considerations, invest in appropriate levels of specialist expertise and institutional capacity, and design and implement programmes with appropriate learner support mechanisms. Without such investment, it is likely that distance learning programmes will see increased levels of dropout and non-completion among learners, thereby reducing the educational and economic efficiency of such programmes.

It is worth noting that the potential to expand educational opportunities for individuals and to enable quality teaching and learning in reduced circumstances form one key theoretical principle that frequently underpins the application of distance learning in a range of contexts. Distance learning is seen as a mechanism that can contribute to the achievement of educational and social equity through the provision of high-quality learning in such a way as to overcome the various physical, social and economic circumstances that can otherwise limit the individual's access to education or the institution's ability to provide it (Perraton, 2007). This is of particular relevance when discussing educational provision in low and middle income countries, or those countries with reduced domestic educational capacity. It is also of particular relevance when the UN MDG project explicitly views health provision as a means of addressing social inequality across geographically isolated locations and socially marginalised communities, namely 'reducing poverty, social exclusion and inequity, and advancing democratic development and human rights' (World Health Organisation, 2005).

5.3. A brief history of distance learning in health worker training

The following sub-section provides a brief overview of the development of DL as a tool for the training of health workers. For a more general examination of the historical development of open and DL as a discipline, please refer to Annex 2.

5.3.1. Early developments in distance learning for health worker training

Few early examples of DL4H worker training have been identified, dating back only to the mid-1960s. In 1997, a team of researchers from IGNOU's School of Health Sciences looking at the history of DL4H came to the following conclusions:

> 'A review of the literature reveals only a few courses in healthcare subjects based on distance teaching/ learning developed in the last three decades. A distance learning programme for family physicians and nurses of various categories in Australia and Texas, USA, was initiated in the mid sixties. Similarly problem-based approaches on various diseases, through distance education, was started in a few African countries, namely Kenya, Tanzania and Sudan by the Welcome Tropical Institute as were needs-based healthcare courses in Philippines, Thailand and China.' (Dutta, 1995)

UNISA launched its Bachelor of Nursing Science in 1975 and, in the UK, the University of the South Bank, formerly the South Bank Polytechnic, also launched programmes of post-initial training for nurses and other paramedics in the mid-1990s. Also from the 1990s, Dutta et al. (ibid.) cite examples of medical education and health management courses for general practitioners conducted by Dundee University, and indicate parallel growth in this area of training in India.

IGNOU itself launched a post-basic BSc Nursing Science in July 1994, and later added a Postgraduate Diploma in Maternal and Child Health for medical officers/ private practitioners in collaboration with the World Health Organisation (see case study: IGNOU: PG Dip Maternal and Child Health). Over the course of time, they followed this with a significant number of post-qualification programmes covering a range of specialties.

The demand for formal post-qualification programmes delivered through distance education has increased over the years. Pre-service distance education has also become more common for dental hygiene programmes in the USA (Grimes, 2002). Large scale extension health worker training via DL is in the process of rollout in Ethiopia with the support of UNICEF, The Open University and AMREF. The School of Public Health at the University of the Western Cape (UWC) in South Africa has reported four times the number of applications than places from more than 20 African countries (Alexander et al., 2009).

5.3.2. The development and growth of online learning in health worker training

The growth of health worker training by DL has been phenomenal since the rapid spread of the Internet, especially in industrialised countries. In fact, much of the recent literature on health worker training concentrates almost exclusively on the use of the Internet and other forms of online learning. In undertaking a 'Meta analysis of internet-based learning for health professionals', Cook et al identify nearly 2,200 articles on such uses (Cook et al., 2008b). It is also reported that programmes of online learning for health professionals are regarded by the users as largely successful. Curran, in approaching a comparative study of the effectiveness of different formats of online learning, scheduled group learning and learning on-demand among health workers, and reported on the apparent greater effectiveness of online learning as a distinct model (Curran, 2010).

However, web or Internet-based learning as applied to health worker training is significantly diverse in approach. This makes it difficult for effective comparisons regarding advantages of such approaches over others (Cook et al., 2010b). A multitude of tools is available to support e-learning (e.g. – wikis, blogs, podcasts), some of which promote collaboration between learners and health professionals and enable on-demand, peer review, shared knowledge development, and interdisciplinary interaction (Boulos et al., 2006, Cook et al., 2010b). These tools are user friendly, easy to develop and utilise, given the plethora of open-source software (Boulos et al., 2006). Examples of how e-learning may be used in education and training include building paediatric communication skills via online video programmes (Kemper et al., 2008); standardised national online infection control module in Canada (Bryce et al., 2008); live videoconferencing and broadcasting in Pacific Islands States (Chen et al., 2007); online case conferencing for interdisciplinary learning (Santy et al., 2009); enabling interdisciplinary collaboration (Juntunen and Heikkinen, 2004) and web based portfolio systems to promote reflective learning (Ng et al., 2009). It should be noted that such initiatives are only discussed in this review when they form part of an accredited post-qualification training programme. However, the proliferation of such mechanisms in the gathering and sharing of information and in the support and mentoring of health workers is an indication of the extent to which distance methodologies are increasingly used in the strengthening of health systems.

Variance in the effects of e-learning compared to other forms of learning may be attributable to differences in learners, educational delivery, and differences in measured outcomes between studies (Cook et al., 2008b). As with face-to-face education and training, cognitive and learning styles have also been shown to have an influence in e-learning (Cook, 2005, Wong et al., 2010, Carnwell, 2000). For example, holistic learners were found to require structure, a broad-before-deep approach and social interaction; compared to analytic learners who preferred less structure and a deep-before-broad approach (Cook, 2005). Despite such heterogeneity, there seems to be some indication that e-learning design features such as interactivity, practice exercises, repetition, and feedback can improve learning outcomes (Cook, 2008).

Given the substantial proliferation of DL4H programmes in the post-Internet era, it seems clear from the literature and from the available cases that online learning approaches predominate for distance-based health worker training in the industrialised world, especially in the Europe, USA and Canada. There are however, significant exceptions. A recent article trying to evaluate the use of online learning for continued medical education, records that, of 514 articles obtained for the study, 139 were 'not appropriate' as they were about training which was not exclusively Internet-based (Wong et al 2010. p4). The implications are that DL4H programme design continues to utilise 'non-virtual' media and technology, at least in combination with online study, or may combine online study with face-to-face inputs by including them within a blended approach to programme design.

5.3.3. Current developments in health worker training by distance learning in low and middle income countries

There are indications of an increased interest in the use of innovative and non-formal delivery methods for the training of health workers. In sub-Saharan Africa, for example, provider institutions report on using delivery modes such community-based education and interdisciplinary team-based learning (Mullan et al., 2010a). However, based on a review of available literature, few actual DL courses appear to be in place for health

workers in LMICs. The articles identified, for example, programmes in Uganda (Bbuye, 2008), South Africa (Gwyther and Rawlinson, 2007, Greenop, 2008), the West Indies (Thurab-Nkosi, 2000), Kenya (AMREF, 2010), India (Zachariah, 2004, Srivastava, 2008),and Namibia (Dodds, 1999). Many, but not all, were still at the experimental stage when the articles were written. Some have been run entirely on local resources (e.g. India, Namibia, Uganda and the West Indies); others are the collaborative efforts of an institution in the industrialised world and one or more institutions in LMICs (e.g. South Africa, and Kenya).

However, it is worth noting that the case study review undertaken in relation with this report identified a significant number of DL4H programmes not otherwise featured in current literature. The majority of these programmes commenced within the last decade. As many of the cases presented here did not feature widely in published literature, and since the case studies presented by this review do not claim to be a fully comprehensive catalogue of current worldwide activities in DL4H, it can be inferred, firstly, that the activities and experiences of current DL4H activities in LMICs are not widely disseminated, and secondly, that there are likely to be greater numbers of local, national and regional DL4H programmes currently ongoing around the world than is currently indicated by the available literature.

This inference is supported by the fact that, parallel to this largely undocumented availability of DL4H in LMICs, there has been a growing recognition among practitioners of the potential of such programmes as a means of radically addressing HRH requirements at the national level, as well as enhancing health worker performance in priority competencies.

5.3.3.1. Evidence of systemic barriers to health training by conventional means

Published evidence shows that conventional approaches to face-to-face training cannot address the capacity needs facing most health systems in LMICs. For example, in the context of public health training, situational analyses are under way in several countries. In Ethiopia, a country of 75 million people, there were approximately 250 Masters in Public Health graduates from conventional Ethiopian institutions between 1997 and 2007. In 2006, there were places for only 10% of applicants to Addis Ababa University's Masters in Public Health programme. Similarly, in Sri Lanka, there were 94 specialist graduates in community medicine from the Postgraduate Institute of Medicine between 1980 and 2007, and all of these were doctors: in spite of the perceived need, there are no Master's courses for non-medical public health graduates in Sri Lanka (Heller et al., 2007).

In addition to the limitations of institutional capacity to facilitate training, evidence shows that there are geographic and systemic barriers to accessing training for health workers. In Ghana, for example, healthcare workers, particularly those in rural or remote areas, have difficulties in accessing conventional training opportunities due to their isolation from training centres. This is compounded by Ghanaian Ministry of Health policy, which limits access to post-qualification training according to occupational group. Thus, only a few healthcare providers from each occupation are given study leave with pay, often leaving others waiting to access training opportunities long beyond the stipulated three-year period of service one needs to qualify for study leave with pay (Mensah et al., 2009). As a result of this inability to access training, evidence shows that these neglected cohorts of workers will experience 'a decline in skills and knowledge, professional dissatisfaction, low morale, disillusion, lack of commitment, and reduced interest in their work' (ibid. p1). Those in rural areas in particular often miss opportunities for career advancement and frequently look to urban areas for work, resulting in high attrition from the health service and contributing to a negative spiral in terms of systemic capacity. Landon (2004), in a study on access to basic training among rural health workers, concluded that improving access to training was an important element of improving retention, and investing in education is the most sustainable way to ensure that there is a long-term strategy to address high attrition rates. Similarly, for post-qualification training, continuing professional education to ensure the extension of nurses' roles is considered as a key factor in nursing retention (Gould et al., (2007)).

5.3.3.2. Evidence of interest in distance learning methodologies for health worker training

The need for a large number of health workers in correspondence with increased demands on domestic health systems, and the acknowledged value of ongoing post-qualification training among health professionals, has

led to increases in the application of distance teaching and learning in the health sector (Mensah et al. 2009). Several studies have been published highlighting both the potential and the need for health worker training via distance learning, including, for example, Tanzania, Ghana, Pakistan, India, and The Gambia (Brigley et al., 2009) (Mensah et al. 2009) (Shah, 2008) (Srivastava et al 2008) (Dawson, 2005).

In certain contexts, the design of open learning models that address the needs of health professionals in remote rural communities is seen as critical to the improvement of health services, since it offers opportunities to overcome geographical restrictions; improve capacity at training institutions; increase overall access to information resources; support and enhance the on-the-job performance of health workers; and encourages flexible learning and context-specific practice by adapting educational materials to the needs of learners from rural areas (World Health Organisation, 2001).

Dependent on the setting, DL is seen as an effective and economical strategy for reaching widely dispersed health workers (Mensah et al. 2009). It can increase access to information and training among rural health workers by reducing individual travel and accommodation costs (Davies et al., 2005). In strengthening health systems other than through training inputs, distance methodologies have also been used to improve health service delivery and support of clinicians in LMICs, in part as a means of assisting HR development and capacity, if not formal training and education. Examples include Guatemala (Brambila et al., 2005) and Western Africa (Geissbuhler et al., 2003).

However, in the use of DL to address the training needs of rural health workers, there are broader issues associated with rural placement that may affect response rates and learner uptake of such mechanisms, particularly among post-qualification learners. Graduates in many countries across sub-Saharan Africa decline to work in rural areas because of the lack of clinical support and the lack of professional opportunity. For example, graduates from Ibadan University in general avoid employment in Nigeria's network of secondary hospitals because of poor pay, poor working conditions, and shortages of supplies, equipment and support staff (Mullan et al., 2010a). One of the main domestic challenges facing health systems in LMICs is the 'urban bias' of health professionals and their reluctance to work in remote rural areas among underprivileged populations (Frenk et al., 2010).

Web-based learning in sub-Saharan Africa

''Modern information and communication technologies have revolutionised medical education in many countries and promise to bring greater access to high-quality educational products to schools in sub-Saharan Africa as well. Educators have described the integration of web-based Course Tools (WebCT) into a new problem-based curriculum with great success: students and faculty used the interface to communicate more frequently. Other educators have reported use of WebCT as superior to other distance-learning technologies such as interactive television and have developed online 'spiral curricula', in which students build and reinforce competency in new subject areas by revisiting prior course materials online.

While WebCT represents the cutting edge of educational technology, it does require start-up and maintenance costs, which are prohibitive for many sub-Saharan Africa schools. Accordingly, some educators have employed more affordable technologies such as 'Video-projected Structured Clinical Exam' and video-conferencing for teaching, clinical consultation, and continuing medical education.

Beyond the obvious cost barriers, another considerable problem is the so called 'digital divide' or gap in computer literacy between students in resource-poor countries and the West... On the other hand, some authors have shown that students are able to adapt quickly to Internet-based innovations regardless of whether they were highly computer savvy or barely computer literate when they entered medical training."
From (Mullan et al., 2010b)

5.3.3.3. Evidence of the perceived value of distance learning for health workers

DL is primarily seen as supporting work-in-place study, a key factor in training for the enhancement of health worker performance (see Section 3). In facilitating the practice of work-based learning among health professionals, DL is seen as enabling participants to learn from their clinical duties, and apply newly-learned skills and knowledge to clinical practice. With appropriate pedagogic design, the flexibility associated with DL allows each trainee to analyse relevant aspects of the medical, research, and management issues associated with their particular area of interest in relation to the everyday problems they encounter (Davies et al., 2005). This works towards an enhanced integration of practice and knowledge, based on the principle that studying while working facilitates the integration of new conceptual knowledge with practice through the application of responses to real situations in assignments and projects (Alexander et al., 2009). This perception is supported by findings on the UWC Masters in Public Health, where one of the advantages of offering DL has been to facilitate the simultaneous integration of new conceptual knowledge with practice, where students are expected to apply new approaches to familiar problems (ibid. p5). Further to this, and with appropriate pedagogic design, DL is seen as encouraging health workers to develop enhanced skills for self-directed learning. After an initial period of adaptation, studying at a distance nurtures self-directed learning habits, allowing health workers a choice of pace and approach (ibid.p3). In utilising this approach, the primary benefit of DL is seen as raising clinical standards by producing better informed and more reflective clinicians (Davies et al., 2005 p279). With appropriate delivery mechanisms, DL is also seen to offer substantially increased potential for establishing networks of health practitioners, enabling them to exchange experiences and information gathered from across a range of contexts and settings (Joynes, 2010).

In addressing the motivational needs of health professionals, highlighted by Mensah (2009), Landon (2004) and Gould (2007), DL is seen as offering increased potential for training health personnel in smaller towns,

capitalising on the strengths of what Myers (2005) terms 'place-committed local students'. Place-commitment is presented both in terms of professional roles and responsibilities at the local level, and in terms of personal commitments. Professional responsibilities might include the need to maximise local clinical activities and maintaining existing on-call commitments. This is particularly relevant in isolated or rural communities with few alternative health facilities. Family and domestic responsibilities frequently make it difficult for doctors to attend taught courses that require them to reside away from home for lengthy periods at a university centre, which is especially the case as an increasingly large proportion of the medical workforce is female (Davies et al., 2005). DL enables such health workers to continue their studies and upgrade their skills without adversely impacting on their personal and professional roles.

From a systemic perspective, evidence shows that DL can also resolve the dilemma of how to provide high-quality education in health subjects where the number of potential participants is small and they are widely scattered (Davies et al., 2005). The use of DL as a means of attaining outreach to scattered learners is also seen as bringing potential benefits to institutions through the upscaling of programmes. For example, the University of the Western Cape's Masters programme in Public Health had grown between 2000 and 2007 to a 'multi-nation African student community based in more than 20 African countries, including Botswana, Cameroon, Djibouti, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Tanzania, Senegal, South Africa, Sudan, Swaziland, Uganda, Zambia and Zimbabwe'. In 2007, 33% of the students were in South Africa, with 65% from other African countries and a small number outside the African continent (Alexander et al., 2009). This has taken place at the same time as reducing capacity demands on conventional training institutions, where the choice of a predominantly distance mode of study has had the institutional advantages of reducing lecturing staff numbers and reducing institutional costs. A small number of subject experts can write material for large numbers of students, while senior students and new graduates can assist in tutoring, assessing and supporting students (ibid. p3).

5.4. Conclusions

DL has the potential to deliver quality education to cohorts of learners who might otherwise be unable to access conventionally delivered opportunities due to geographic, social or economic reasons. In addition, DL can play a role in expanding educational provision in settings where there are limited physical and academic resources. However, DL places additional academic and personal demands on the learner and it requires provider institutions to take into account the need for appropriate programme design and delivery underpinned by adequate investments in research, specialist expertise, instructional design capacity, learner support mechanisms, and logistical infrastructure.

While the widespread use of DL in the training of health workers appears to be relatively recent phenomenon, there is growing recognition of the part that it can play in addressing current constraints on HRH training in LMICs, as well as its potential in facilitating the range of applied modalities and approaches to teaching and learning that contribute to improvements in health worker performance and, subsequently, to health systems strengthening.

DL is seen as a mechanism that can contribute to the achievement of educational and social equity through the provision of high-quality learning in such a way as to overcome the various physical, social and economic circumstances that can otherwise limit the individual's access to education or the institution's ability to provide it (Perraton, 2007). This is of particular relevance when discussing educational provision in LMICs, or those countries with reduced domestic educational capacity. It is also of particular relevance when the UN MDG project explicitly views health provision as a means of addressing social inequality across geographically isolated locations and socially marginalised communities, namely 'reducing poverty, social exclusion and inequity, and advancing democratic development and human rights' (World Health Organisation, 2005).

Section 6: A summary overview of current activities in distance learning for health workers in low and middle income countries

6.1. Introduction

This section provides a summary overview of current activities in post-qualification DL for the training of health workers in LMICs, and does so by an analysis of the case studies gathered in relation to this review.

Drawing on the case studies, this section will present a generalised overview of current trends in DL4H in terms of content, audience and delivery mechanisms by grouping programmes according to: geographic reach; provider institutions and partnerships; funding mechanisms; programme content; target audience cohorts; and scale of enrolments. For each of these, a basic analysis of findings will also be provided, in relation to their implications for the identified priorities for health systems strengthening (see Section 3). A more detailed analysis of programme design and delivery, in terms the relationship to teaching and learning approaches for performance enhancement and health systems strengthening (see Section 4), is undertaken in Section 7.

For a series of matrices categorising individual case studies according to a range of criteria associated with the graphs below, please refer to Annex 3.

6.1.2. Note on the selection of case studies

This report presents a total of 37 case studies, representing 40 programmes provided by 29 institutions, selected from a shortlist of 87 possible case studies that were reviewed in detail. The final selection of case studies was made on the basis of a number of criteria.

Firstly, a judgement was made on the extent to which each case fulfilled the basic remit of an accredited post-qualification DL programme of training for health workers in LMICs. A number of programmes were excluded as a result of one or more of the following: they were unaccredited; they had only limited or insubstantial components of DL; they nominally accepted registration from learners in LMICs, but in fact took only limited consideration of the academic and logistical needs and requirements of such a cohort.

Secondly, a number of programmes were excluded on the basis that inadequate information was available to complete the case study template to a useful degree. This applied in particular to information related to programme history, programme content and accreditation, and programme design and delivery mechanisms. In most case studies the lack of information occurred because either: the required range of information was not available in the public domain (websites, journals, publications, conference proceedings etc.); or the review could not establish contact with the programme providers to gather that information; or that the programme providers were unwilling to share that information. A small number of case studies were excluded because the programme in question only commenced in 2010, or is scheduled to commence in 2011, and therefore could not provide any detail regarding enrolment rates, evidence of impact etc.

Thirdly, in the interests of providing an adequate range and diversity of case studies to accompany the report, a number of programmes were excluded from the final list where there were already numerous similar case studies, and where additional examples were not seen to add significantly to the range of models on offer. In particular, this occurred with case studies representing either particular programme content (e.g. Nursing, Public Health); particular regions or nations (e.g. sub-Saharan Africa); or particular institutions (e.g. IGNOU; University of Dundee).

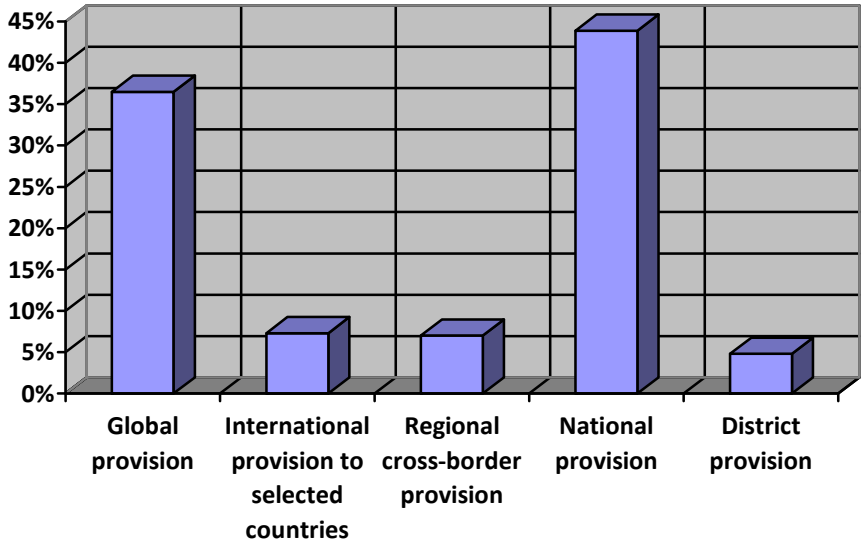
Finally, the case studies gathered as part of this review do not represent the full range of activities in post-qualification DL4H currently ongoing at the global level. As such, the information presented here should be

regarded only as an indication of current activities.

6.2. Programme delivery according to geographic reach

The programmes featured in the case studies were analysed according to their geographic reach, based on their delivery to global, regional and national cohorts of learners. The results are as follows:

Table vi: Distribution of programmes according to geographic reach (N = 40)



Of the case studies where programmes are provided at the global or international level, 17 are provided by institutions based in the UK and the US, and only one is provided by an institution based in a low or middle income country. It is worth noting that this is the WHO-sponsored Masters in Public Health, developed and delivered by the University of the Western Cape with substantial support from a major international body.

Of the three international programmes provided to selected countries, the OU HEAT programme is currently working with a specific target audience (health extension workers in Ethiopia) with a view to developing materials that will be made available to a general audience of community-level health workers across sub-Saharan Africa and the Horn of Africa. The University of Dundee's Masters in Palliative Care is provided to cohorts of learners in Kenya on the basis of a partnership arrangement with AMREF Kenya, who provides supplementary face-to-face support.

Of the three programmes provided across borders at the regional level, one is the University of Ibadan's MSc in Biomedical Education, provided to learners across West Africa through a partnership arrangement with the West African Medical and Nursing School Consortium. The other two are programmes provided by the University of West Indies to learners across 10 Caribbean island nations.

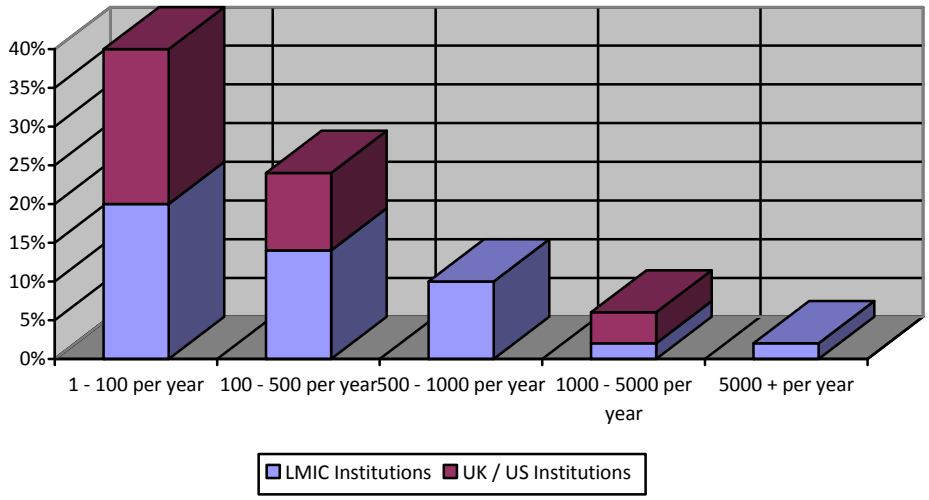
Of the 18 programmes provided for a national domestic cohort of learners, nine are based in India, four in sub-Saharan Africa, two in Sri Lanka, two in Malaysia and one in Brazil. Of the two programmes provided at the sub-national or district level, both are based in Tanzania.

For further details on the geographic reach of specific programmes, please refer to Annex 3, Matrix 1.

6.3. *Programme delivery according to scale of enrolments*

The programmes featured in the case studies were analysed according to the scale of enrolments. The results are as follows:

Table vii: Distribution of programmes according to scale of enrolments (N = 40)



The findings above indicate that 20 of the 40 DL4H programmes analysed reached between one and 100 students as part of annual intake. Based on the programmes included in the case studies, the average annual intake is approximately 30 – 40 students per programme. However, there are some programmes with a much lower intake, and one with an annual enrolment of 16 students.

14 out of 40 programmes enrol between 100 – 500 students per year, and the majority of these have fewer than 200 students per year. Five out of 40 programmes reach between 500 – 1000 students per year, three out of 40 reach between 1000 – 5000 students, and only one reaches over 5000 students.

It is worth noting that those programmes with a global reach do not necessarily recruit more students than those with a more localised reach. This is likely due to the limitation on numbers created by institutional capacity and higher enrolment fees for international programmes. In fact, the majority of programmes with an intake of over 100 students per year are those with a regional or national reach. The programme with over 5000 enrolments is the Brazilian PROFAE / PROFAPS programme, which is estimated to reach, nationwide, cohorts of learners in the hundreds of thousands. However, it is able to do so by operating through a highly decentralised approach to programme implementation that is coordinated primarily by health authorities at the state and sub-state level. As such, it is regarded somewhat as a unique case.

- ***Implications of findings***

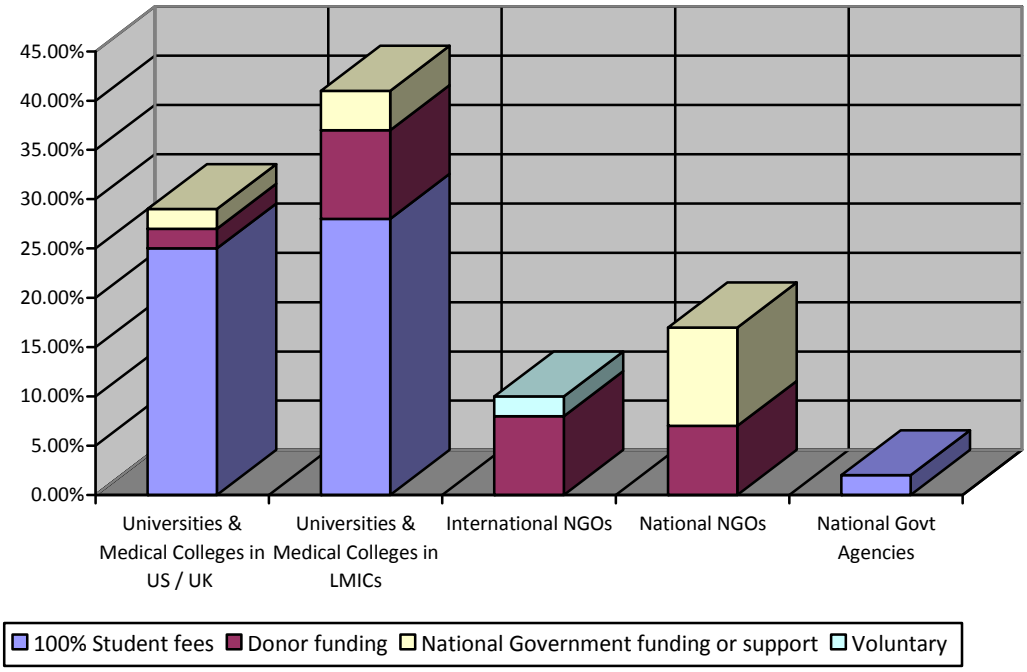
The overall implications of these findings are that, currently, DL is not facilitating a significant scale-up in health worker training, unless in unique circumstances. In the case of Masters-level programmes provided by tertiary education institutions, the levels of enrolment per programme appear to remain largely equivalent to enrolment figures for conventional campus-based programmes. It is only in the case of nationally coordinated health worker upgrading programmes (e.g. see Case study: AMREF: Nurse upgrading), or those benefiting from strong state advocacy, that any significant change in pattern is observable.

For further details on the scale of enrolments of specific programmes, please refer to Annex 3, Matrix 1.

6.4. *Programme delivery according to provider institutions*

The programmes featured in the case studies were analysed according to the range of provider institutions, in combination with a summary analysis of the means by which the programmes are funded. The results are as follows:

Table viii: Distribution of programmes according to provider institutions and funding mechanisms (N = 40)



In general terms, 29 of the 40 programmes featured in the 37 case studies are provided by universities or medical colleges at the tertiary level. 12 of these are based in the UK or US, and 18 in low or middle income countries. The majority of these programmes are funded 100% by student fees (including externally-funded student scholarships, bursaries etc.). However, a small proportion of programmes received supplementary funding from international development, donor or government agencies to cover the costs of programme development and/ or implementation (two programmes from the UK/ US; six programmes in LMICs).

A further 10 programmes are provided by NGOs, four of these are provided to a global audience by international NGOs based in the UK/ US, three of which receive financial support from international development or donor agencies, one of which (Peoples-uni) implements its overall programme through voluntary support. Six programmes are delivered by national NGOs based in LMICs, two receive financial support from international development or donor agencies, the other four receive substantial support from national government agencies.

Finally, one programme, the PROFAE / PROFAPS programme in Brazil, that is funded and delivered wholly by national and district government agencies.

It is worth noting at this point that, in many case studies, both the division of funding sources, together with the nature of national government support, are often difficult to separate precisely without reviewing individual programmes in some detail. The models of funding and support across any programme that does not rely on 100% student fees are often complex, and usually best analysed on a case-by-case basis. For example, several NGO-provided programmes (FAIMER: Fellowship in Medical Education; OU-FAIMER: Medical

Education; AMREF: Nurse Upgrading; Peoples-uni: Cert/Dip Public Health) charge learner fees at a nominal rate, in addition to utilising donor funding. In addition, other programmes can involve universities, medical colleges or NGOs working with complex financial and support arrangements across a range of commercial, government and donor partners. Again, AMREF Kenya acts as a case-in-point. Particularly in the case of the programmes provided by national NGOs (see, for example, case studies: NCDE Tanzania; CDEHA Tanzania; NRHM India; PHRN India), they are frequently delivered in close collaboration with state networks at the district and local level, and often with technical support from tertiary education institutions.

A further discussion of the various issues surrounding programme delivery through partnerships and consortia arrangements is provided in Annex 7.

For further details on the provider institutions and funding mechanisms for specific programmes, please refer to Annex 3, Matrix 2.

6.5. Health worker training at a distance based on area of study and qualification

The programmes featured in the case studies were analysed according to the general areas of health study that their content covered, and the qualifications on offer. The results can be presented as follows:

Table ix: Distribution of programmes according to area of study (N = 40)

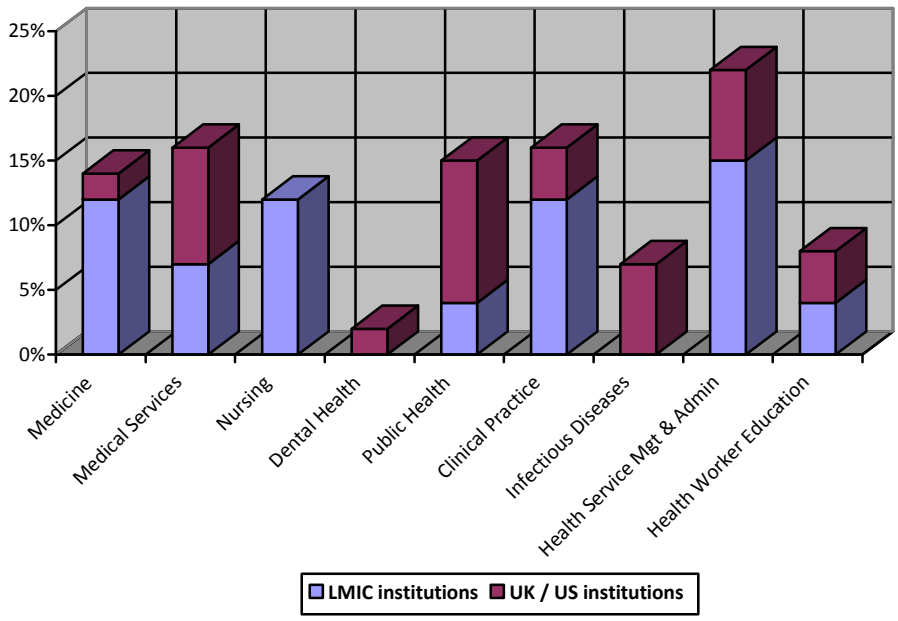


Table ix outlines the different programmes offered by programme group. For further details on the distribution of area of study for specific programmes, please refer to Annex 3, Matrix 3.

Table x: Individual programmes included in the case study review according to programme group

Programme group	Individual programme included in case review

	(number of programmes)
Medicine	MSc in Palliative Medicine (1) BSc Ophthalmic Techniques (1) PG Dip Clinical Cardiology (1) PG Dip Maternal and Child Health (1) PG Dip Newborn and Infant Care (1)
Medical Services	MSc Palliative Care (2); MSc in Counselling (1) BA Medical Imaging (1) various courses for professional development (see Case studies for OU HEAT; Johns Hopkins Centre for Clinical Global Health Education; Open University of Sri Lanka Continuing Education in Medicine courses)
Nursing	Masters Nursing (1) BSc Nursing (1) plus three country-specific programmes for accredited nurse upgrading (see case studies for AMREF; NCDE Tanzania; PROFAE / PROFAPS)
Dental Health	MSc in Dental Public Health
Public Health	MSc / Masters in Public Health (4) MSc in Epidemiology (1) PG Cert / Dip in Public Health (1) various courses for professional development (see case studies on Johns Hopkins Centre for Clinical Global Health Education)
Clinical Practice	Fellowship in HIV Medicine (1) MSc in Clinical Trials (1) MSc in Family Medicine (1) PG Dip in Family Medicine (1) Various courses for professional development (see case studies: Johns Hopkins Centre for Clinical Global Health Education; NCDE Tanzania; PROFAE / PROFAPS).
Infectious Diseases	MSc in Infectious Diseases (2) various courses for professional development (see case studies: Johns Hopkins Centre for Clinical Global Health Education)
Health Services Management and Administration	MSc International Primary Health Care (1) BA Nursing Science (1) PG Dip in District Health Management (3) PG Dip in Hosp & Health Mgt (1) various courses for professional development (see case studies: Management Sciences for Health VLDP; Johns Hopkins Centre for Clinical Global Health Education)
Health Worker Education	Fellowship in Medical Education (1) MSc in Biomedical Education (1) BA in Health Sciences Education (1) Post-graduate courses in Medical Education (see case study: OU-FAIMER: Courses in Medical Education)

6.5.1. Implications of current provision in addressing outstanding competency needs

With respect to health worker competency needs for health systems strengthening identified in Section 3.3.1, there are a number of conclusions that might be inferred from the range of courses presented above.

6.5.1.1 Management competencies, including supply chain management and procurement

There are indications that a reasonable range of programmes address health management competencies (eight out of 40), and include programmes at diploma level. In addition, a number of these (four out of eight) are designed and delivered by institutions in LMICs to provide training according to the needs of specific localised contexts at the district level. However, the extent to which this range of programmes can address the related set of specific competencies in procurement and supply chain management is open to question, and can only be addressed by looking in detail at the specific content of each programme on offer.

6.5.1.2 Educator competencies

There is a small number of programmes addressing competencies in educational provision for health workers on offer (four out of 40), two of which are developed and delivered by institutions in sub-Saharan Africa. However, it is important to note that of the four examples featured here, one is provided annually to a small and highly select cohort of learners, indicating overall a limited range of opportunities and low levels of access in this field.

6.5.1.3 Researcher competencies

Programmes designed to address the need for researcher competencies are the least-represented area from the five identified in Section 3.3.1. Although it may be assumed that the range of Masters-level programmes on offer here (16 out of 40) will engage learners in developing an understanding of the theory and practice of research, information gathering and data processing according to their various fields, possibly only the MSc in Clinical Trials from the London School of Hygiene and Tropical Medicine will address the role and function of research as applied within health systems in general. The selection of stand-alone courses on offer from a number of institutions (e.g. see case studies: Johns Hopkins Centre for Global Health; OU HEAT; OU-FAIMER) may also include units of study concentrating on research skills for health workers.

6.5.1.4 Primary healthcare competencies

Primary healthcare competencies are the best represented by the range of programmes on offer (approximately 18 out of 40), in that they are addressed either directly or in part by the range of Masters, diploma, staff upgrading and continuing professional development programmes currently on offer in fields such as primary healthcare, nursing, family medicine, maternal and child health, and public health.

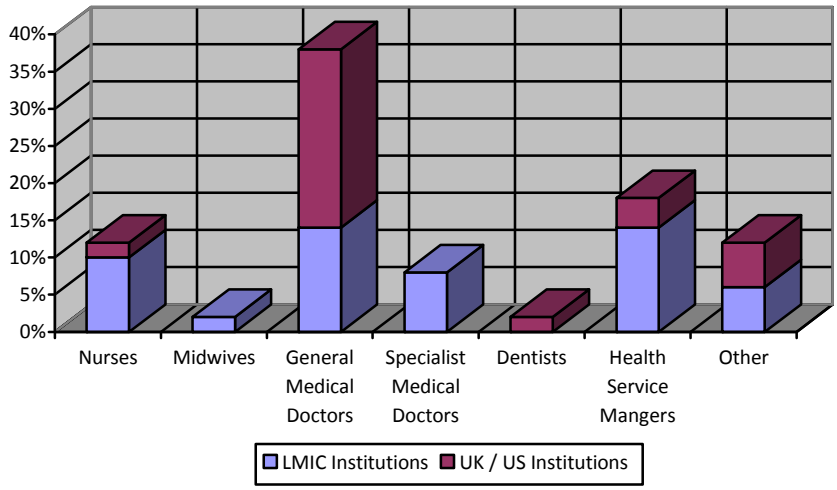
6.5.1.5 Advanced medical specialist competencies

A small range of programmes address advanced medical specialist competencies (seven out of 40), including in areas such as HIV/ AIDS, epidemiology, infectious diseases, cardiology, and ophthalmology. However, it is also worth noting that, for the most part, these specialties are represented by solitary programmes that appear to be unique in their field. The extent to which these can contribute to the required enhancement of specialist knowledge at the national or global level has to be investigated further.

6.6. Distance learning according to professional cohort

In addition to being designed to enhance competencies in a field associated with a particular area of professional practice (e.g. Nursing, Health Service Management), a significant number of the programmes are suitable for a generalised audience of post-qualification health workers, rather than for a specialist audience, and are therefore open to any individual with the requisite academic (rather than professional) qualifications. With this in mind, the results presented in table xi represent only an approximate distribution across cohorts.

Table xi: Distribution of programmes according to professional cohort (N = 40)



The findings indicate that the cohort with the greatest range of opportunities to enhance their professional skills and competencies through post-qualification study at a distance are general medical doctors (graph v, table v). However, it is not clear from the available information whether the same range of opportunities are available to general medical doctors regardless of whether they are based in hospitals, clinics, or community health centres. It should also be noted that, by and large, general medical doctors are also able to access the range of health management programmes on offer, and are often included as part of the target audience whose managerial skills these programmes are designed to enhance.

The cohorts with the lowest number of opportunities include midwives and dentists, with one programme each. In the case of dentists, however, there were indications of a greater range of DL4H programmes in dentistry, although the case study review was unable to gather adequate information to feature them further. In addition, the graph above does not feature pharmacists, for whom there were no DL4H programmes identified.

The cohorts grouped under 'Other' cover a range of health professionals not featured elsewhere, including clinical assistants, medical technicians, health administrators, and care staff, each of whom have access either to specialist programmes (e.g. see case study: UiTM BA in Medical Imaging); country-specific upgrading programmes (e.g. see case study: NCDE Tanzania; PROFAE / PROFAPS), or are able to access some of those programmes with a generalist admission policy.

Table xii: Range of training available by cohort

Cohort	Range of training available
Nurses	Masters in Nursing (1) MSc in Palliative Care (1) BSc in Nursing (1) BA in Nursing Science (1) with emphasis on managerial skills BA in Health Sciences Education (1) PG Cert Newborn & Infant Care (1) Country-specific programmes for accredited nurse upgrading (3) (see case studies: AMREF; NCDE Tanzania; PROFAE / PROFAPS)
Midwives	PG Cert Newborn & Infant Care (1)
General Medical	MSc Epidemiology (1) MSc Infectious Diseases (2

Doctors	MSc Palliative Medicine (1), MSc Palliative Care (1) MSc / MA Public Health (3) MSc Family Medicine (1) PG Dip Family Medicine (1) MSc Counselling (1) MSc Clinical Trials (1) Fellowship in HIV Medicine (1) Fellowship in Medical Education (1) PG Dip in District Health Management (1) Courses for professional development (see case studies: Johns Hopkins Centre for Clinical Global Health Education; OU SL CEMs; OU-FAIMER).
Specialist Medical Doctors	BSc in Ophthalmic Techniques (1) PG Dip in Clinical Cardiology (1) PG Dip in Maternal & Child Health (1)
Dentists	MSc in Dental Public Health (1)
Health Service Managers	Masters in Public Health (1) MSc International Primary Health Care (1) MSc in Biomedical Education (1) PG Dip in District Health Management (3) PG Dip in Hospital & Health Management (1) Courses for professional development (see case studies: Management Sciences for Health VLDP; Johns Hopkins Centre for Clinical Global Health Education)

Section 7: A summary overview of current practice in distance learning for health workers

7.1 Introduction

This section is designed to provide an overview of current practice in DL for the training of health workers in LMICs. Building on Section 6, which provided an overview of current activities in DL4H, this section commences with a summary introduction to the pedagogic models and teaching and learning approaches of most relevance to DL for health workers. Then, drawing on examples from the various programmes of training identified in the case studies, it goes on to identify a range of modalities currently applied in the design and delivery of DL programmes for health workers in LMICs, including patterns in the use of media and communications technology.

7.2 Pedagogic models and teaching and learning approaches in distance learning for health workers

This sub-section provides a summary of the key pedagogic principles and practices most relevant to post-qualification DL for health workers, and their implications in terms of general teaching and learning approaches to utilise in programme delivery.

In general, there is a lack of literature analysing the theory underpinning post-qualification DL programmes for health workers. Similarly, there is very little reference to the specific pedagogic approaches that form the basis for programme design in the available documentation related to individual case studies. Despite this, it remains important to seek clarification on the pedagogic approaches of greatest relevance to DL programmes for health workers, as this gives an indication of the competencies that are likely to be acquired, and also holds strong implications for the range of both teaching and learning components and learner support mechanisms that can be accommodated within the programme design and delivery model. For this reason, this sub-section also seeks to identify examples of teaching and learning components and learning activities to facilitate the general pedagogic approaches. There is a particular focus on those activities that improve health workers performance, whether through skills enhancement or knowledge acquisition and application.

For a more detailed introduction to the range of learning theories and pedagogies underpinning DL in general, and for health worker training in particular, see Annex 4.

7.2.1 Identifying pedagogic principles for health worker training at a distance

In order to contribute to health systems strengthening, health workers require new or enhanced fields of specialist knowledge, combined with new or enhanced professional competencies that enable them to improve their performance in the work place. Evidence suggests that a mix of synergistic pedagogies are required to improve learning effectiveness (Woodle, 2000). For example, positive effects of emergency obstetric care training programmes were found to be associated with hands-on or applied modalities, team approaches and follow-up training (Bregnhoj et al., 2009).

In conventional, campus-based settings, didactic approaches likely form the mainstay of formal postgraduate programmes and continuing education for health workers, and whilst they may improve knowledge, they may have limited impact on changing skills, attitudes or behaviours (Khan and Coomarasamy, 2006). One review of the effectiveness of didactic versus interactive and clinical integrated pedagogies in evidence based medicine

pre-service education was discussed by Khan and Coomarasamy (2006), who proposed a three-tiered hierarchy for teaching and learning evidence-based medicine. Their review identified that 7/8 published evaluations of interactive educational activities were associated with improvements in practice, whilst in 6/7 RCTs of didactic education activities found no significant differences between groups (ibid.). In applying these findings, Khan and Coomarasamy rated interactive and clinically integrated activities the highest (level 1), followed by interactive classroom activities or didactic and clinical integrated activities (level 2), and finally, didactic, classroom or stand alone educational activities (ibid.).

In further support of the principles of applied or situated learning, the available evidence base indicates the relative benefits of a number of interactive teaching and learning components as a means of improving health worker performance, including in particular: work-based learning (Zmeyov, 1998); community-based learning (Frenk et al., 2010); interactive and clinically-integrated learning (O'Brien et al., 2001); interdisciplinary education (Health Professions Networks, 2010); applied simulated learning (Wiecha et al., 2010, Smith et al., 2007); and feedback and supervision (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005).

With this in mind, post-qualification health worker training programmes should, in the first instance, operate under the principle that their learners, as adults and professionals, are independent, self-directed and possess some experience, and utilise these attributes as part of the learning process (Knowles 1980, cited in (Milligan, 1997). In doing so, these programmes should endeavour to provide learners with the opportunity to: a) reflect on their individual circumstances, in terms of the work environment, their current practices, and fields of knowledge; b) determine what additional skills, knowledge and competencies are required in order to improve these; c) acquire the requisite knowledge, skills and competencies through a variety of means; d) apply it to their professional practice in a work-based setting (Brooks, 1999).

This is a process that is best facilitated through:

- opportunities for discussion, reflection and analysis, particularly in collaboration with professional and academic peers (Wenger, 2002) (Brooks, 1999);
- procedures offering both academic and professional guidance, through tutors, mentors and preceptors (Kolb, 1984);
- work-based forums for the application of new knowledge and skills, through:
    - skills demonstration sessions (Merrill, 2002)
    - work-based practical sessions, and
    - ongoing team work (Wenger, 2002).

These approaches contribute to the model of competency-based education, where learners have the opportunity to explore a range of professional options through various teaching and learning components, such as those above (Frenk et al., 2010). These, used in combination with each other, fit within the general objectives and outcomes that form the basis of transformative learning or education for health workers (Frenk et al., 2010); (World Health Organisation, 2010). This advocates for the development of systemic competencies in health workers that contribute to health systems strengthening by enabling professional development in:

- ‘searching, analysis, and synthesis of information for decision making;
- ‘achieving core competencies for effective teamwork in health systems;
- ‘creative adaption of global resources to address local priorities.’ (Frenk et al., 2010. p1924)

However, it is also worth noting that not all learners are familiar or comfortable with the processes and procedures for self-directed learning, or learning outside of the classroom environment (Olmsted, 2010b). This may be particularly the case with health workers, whose prior experience of learning may have been primarily based on the conventional didactic models described above (Boynton, 2010). Similarly, within those teaching and learning components provided at a distance, there is evidence of differing learner approaches to the materials. For example, a small qualitative and quantitative study of learning approaches of distance learners in nursing education found three types of learners; the ‘global dipper’ (initially reads systematically, then often selectively dips into materials) , ‘systemic wader’ (reads systematically and wades methodically through the

materials), and 'speedy focusers' (rapidly and efficiently focuses on key points) which require different types of support and materials suited to each set of learning preferences (Carnwell, 2000).

The extent to which learning materials and support mechanisms are adapted to the needs of different types of learners in post-qualification DL programmes is currently unknown, but, programmes should seek to accommodate the academic needs and interests of individuals within the design and range of teaching and learning components on offer. For a further discussion of approaches to considering learner needs in DL, see Annex 5.

7.3. Programme design and delivery models in distance learning for health workers

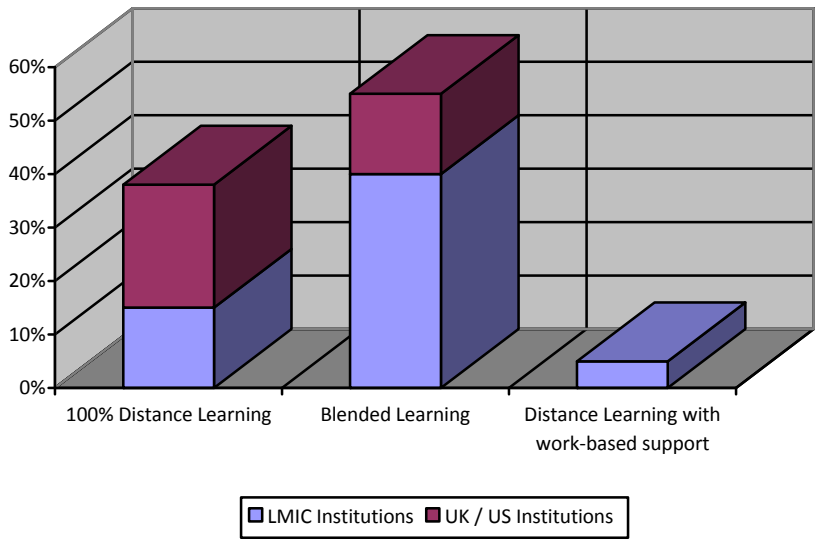
This sub-section summarises key programme design and delivery models commonly applied in the design of post-qualification programmes of DL 4H, including blended and distance modes, and face-to-face and distance mechanisms for learner support. There is a particular focus on those components that are seen to contribute to the enhancement of health worker performance and the strengthening of health systems.

For a summary overview of programme design and delivery models in DL, see Annex 6.

7.3.1. Basic programme delivery models

The programmes in the case studies were analysed according to their basic programme delivery model: pure DL; 'blended learning', where independent self-study is supplemented by regular face-to-face contact for academic purposes; and 'DL with work-based support', where independent self-study is supplemented by formal systems of professional support in the work-place. The results are as follows:

Table xiii: Distribution of programmes according to basic delivery mode (N = 40)



22 out of 40 programmes use a blended learning approach, using some form of face-to-face contact as part of the academic teaching and learning process. A further five use work-based health mechanisms e.g. mentor schemes, preceptorships etc., as a formal means of supplementing to the teaching and learning provided through distance means. Therefore only 13 out 40 programmes from the case studies qualify as pure DL programmes, where all study components involve learners working in physical isolation from study peers and tutors for the duration of their studies. Within this, however, 12 offer learners the opportunity to use the work

environment as part of the teaching and learning process on an informal basis, as their target audience are assumed to be health professionals currently in work.

7.3.1.1. Combined approaches to learner support

Of the 27 programmes that used some form of face-to-face contact, whether through mechanisms of blended learning or work-based support, 18 of these also included the use of distance mechanisms for providing learner support, 11 from LMIC-based institutions, and 7 from UK/ US institutions.

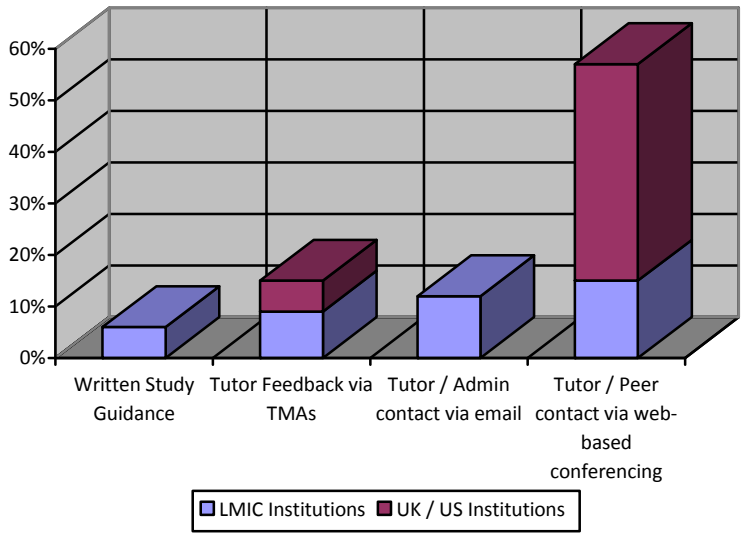
For further information on the distribution of programmes according to basic delivery mode, see Annex 3 Matrix 4.

7.3.2. Distance contact mechanisms for learner support

In addition to the instructional design of self-study materials, the traditional mechanisms for providing contact support to learners at a distance include written study guidance, Tutor-Marked Assignments (TMAs), and periodic contact by telephone. In addition, recent developments in ICT make it increasingly feasible for the physically-distant learner to engage in frequent and personalised dialogue with tutors and peers, to undertake team-based or collaborative activities, and in some case studies engage in virtual 'face-to-face' contact. The findings outlined in Section 7.3.1.1. above highlight the extent to which distance mechanisms for learner support are increasingly available and utilised.

Within the range of programmes in the case studies using distance contact mechanisms for learner support, whether operating as 'pure' DL or with additional face-to-face components, the distribution of contact mechanisms is as follows:

Table xiv: Distribution of distance contact mechanisms across programmes providing learner support at a distance (N = 31)



Of the 31 programmes that provided learner support at a distance, 19 use web-based conferencing to enable tutor feedback, study guidance and peer-to-peer contact through mechanisms such as chat forums. 14 of these are provided by institutions are based in the UK/ US, and it is also worth noting that none of the UK/ US provider institutions provided distance learner support through email alone, preferring instead to use web-based conferencing tools. Of the two UK/ US provider institutions who provided support to their international learners through TMAs alone, it is worth noting that both also provided significant face-to-face support, through 'bespoke' training to specific cohorts in a small selection of nations.

7.3.2.1. Summary analysis of available distance contact mechanisms for learner support

With appropriate design, programmes using written mechanisms for learner support can contribute to the teaching and learning processes associated with reflective approaches to knowledge construction (Holmberg, 1967). In so doing, they can contribute to performance enhancement by encouraging reflection and analysis on personal practice and the work environment (Brooks, 1999) and providing academic and professional guidance (Kolb, 1984). As such, written mechanisms can be particularly useful in contributing to the required provision of feedback and supervision that is of benefit to health workers (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005).

A number of case studies provide examples of how this might be delivered in practice e.g. NHRM, Dip in District Health Management; CMC Vellore, PG Dip Family Medicine; AMREF, Nurse upgrading programme; University of Ibadan, MSc Biomedical Education; Makerere University, Masters Public Health. However, it is also worth noting that these programmes all utilise written feedback as only one element of learner support, and supplement it with a variety of other support mechanisms, both distance and face-to-face. A range of similar approaches to the use of written mechanisms of support can be seen across the case studies as a whole.

While tutors and mentors operating at a distance may have the opportunity to provide new information to learners, their role is more likely to facilitate the approaches learners take in interacting with existing information, and to encourage further and deeper reflection (Brooks, 1999; Kolb, 1984). Web-based support mechanisms, including tutor contact and peer-to-peer discussion forums, offer further opportunities for interacting with existing information through debate and discussion. However, peer-to-peer contact in particular provides an extension to the process of reflection and the construction and application of knowledge to the work environment, as it provides opportunities for interactive and interdisciplinary exchange (O'Brien et al., 2001, Health Professions Networks, 2010), as well as giving individual learners access to different perspectives from across a range of professional contexts.

Tutor contact via email fulfils the same opportunities for encouraging reflection and analysis on personal practice and the work environment (Brooks, 1999) and providing academic and professional guidance (Kolb, 1984) that are outlined in relation to written mechanisms above, with the added benefit of enabling an enhanced frequency of exchanges. Again, such mechanisms can be particularly useful in contributing to the required provision of feedback and supervision that is of benefit to health workers (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005). From the case studies, examples of programmes using this approach include: University of the West Indies, MSc Counselling; London School of Hygiene and Tropical Medicine, MSc Epidemiology, MSc Public Health and MSc Infectious Diseases.

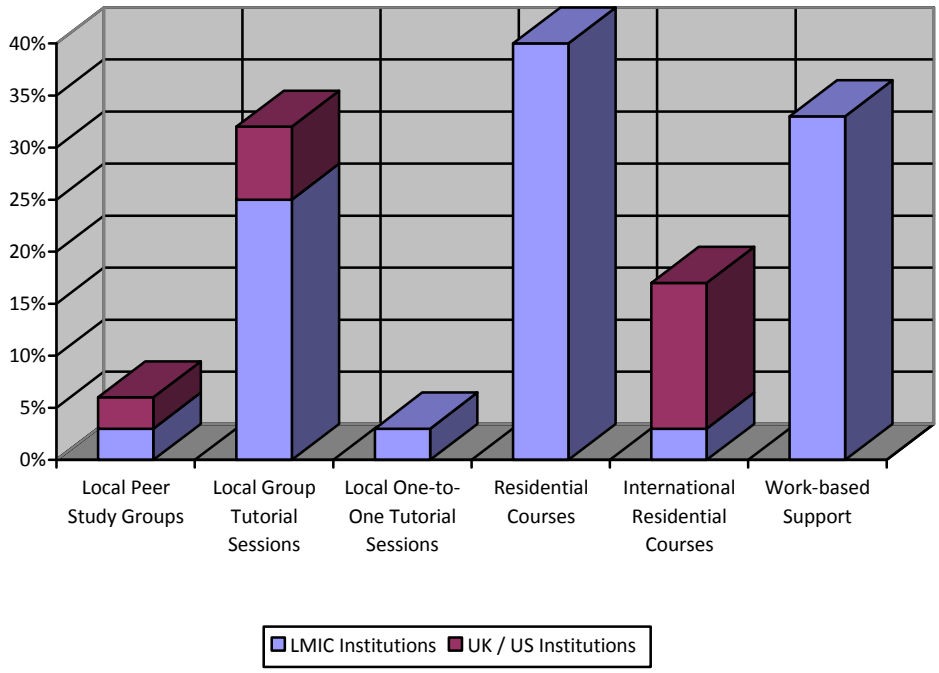
However, peer-to-peer contact through email or web-based forums expand the opportunities for discussion, reflection and analysis, particularly in collaboration with professional and academic peers (Wenger, 2002; Brooks, 1999); and can also facilitate a process of on-going team work (Wenger, 2002). These approaches are demonstrated to various degrees in a range of case studies using web-based modes of interaction among peers, including: UNISA, BA Nursing Science; Edinburgh University, MSc Infectious Diseases; Kings College London, Dental Public Health.

For further information on the distribution of programmes according to distance contact mechanisms, see Annex 3 Matrix 4.

7.3.3. Face-to-face mechanisms for learner support

Within blended learning, the range of face-to-face teaching and learning support on offer to learners commonly includes mechanisms such as local or regional tutor sessions, peer group study activities, residential courses of study (e.g. ‘summer schools’), and work-based support through academic mentoring schemes. Within the range of programmes in the case studies using face-to-face mechanisms for learner support, the distribution of contact mechanisms is as follows:

Table xv: Distribution of face-to-face mechanisms across programmes providing blended or work-based learning support (N = 27)



Of the 27 courses employing various face-to-face mechanisms, nine out of 27 include local tutor group sessions, and 16 out of 27 include residential courses, either in-country or internationally. Only one out of 27 includes a one-to-one tutorial approach, and two out of 27 include formalised peer contact mechanisms, through study groups or team work activities. Nine out of 27 include some form of work-based support within the formal programme design.

It is important to note that six out of 27 programmes employ two or more of the various options for face-to-face learner support as part of their programme design and delivery, and to re-iterate that 18 out of 27 combine face-to-face learner support with some form of support provided at a distance (see Section 7.3.2. above).

7.3.3.1. Summary analysis of available face-to-face mechanisms for learner support

The face-to-face mechanisms for learner support provide the same opportunities for reflective exchange offered by the virtual distance modes, outlined in Section 7.3.2.1. These include opportunities for discussion, reflection and analysis, particularly in collaboration with professional and academic peers (Wenger 2002; Brooks 1999), and the tutor-led inputs of academic and professional guidance (Kolb, 1984) that contribute to improvements in health worker performance through the provision of feedback and supervision (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005).

In addition, face-to-face tutorial and residential sessions offer opportunity for the provision of additional content and information through conventional didactic means such as seminars and lectures. These are often seen to form a staple component of teaching and learning provision in health worker training (see Section 4.4). The findings outlined above indicate that classroom-orientated delivery and didactic approaches to teaching and learning remain popular among programmes utilising distance and blended modes of delivery. Among others, examples from the case studies of programmes using significant face-to-face components include: PHRN: PG Dip District Health Management; NRHM: District Health Management; University of the Western Cape / WHO: Masters in Public Health; UNISA: BA Health Sciences Education; Manchester University: Masters

Public Health; Open University of Malaysia: Masters Nursing; FAIMER: Fellowship in Medical Education; Cardiff University: MSc Palliative Medicine / Care.

However, most significantly, the use of face-to-face mechanisms offers direct opportunities for performance enhancement among health workers through activities associated with clinical practice, such as work-based forums for the application of new knowledge and skills, and skills demonstration sessions (Merrill, 2002). Such teaching and learning approaches assist in fulfilling the benefits to health worker competency enhancement brought by applied and simulated learning mechanisms (Wiecha et al., 2010, Smith et al., 2007) and clinical supervision (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005). Examples of these from the case studies include: IGNOU: PG Cert Newborn and Infant Care; IGNOU: PG Dip Maternal and Child Health; University of West Indies: MSc in Family Medicine. In each case, the learner undertakes a period of work placement at one or more hospitals or clinics across a network of health institutions operating in collaboration with the programme provider institution. Their activities are coordinated by a mentor or preceptor who acts as a professional guide, rather than an academic one, and who contributes to the evaluation process. Out of necessity, such arrangements involve provider institutions working within a consortia partnership with the health systems. The issues associated with consortia arrangements for DL in general are discussed further in Annex 8.3.2.

Work-based learning and community-based learning also enhances the range of interactive and interdisciplinary approaches to teaching and learning available, both for individuals and for teams of learners (O'Brien et al., 2001, Reeves et al., 2008, Health Professions Networks, 2010). This can be achieved in part through that same range of work-based forums for the application of new knowledge and skills, such as skills demonstration sessions (Merrill, 2002), work-based practical sessions, and on-going team work (Wenger, 2002). However, peer groups of learners in a work-based setting can enhance the process of discussion, reflection and analysis (Wenger, 2002; Brooks, 1999), particularly with regard to analysis of the work environment and work-based practice. For greater assurance of effectiveness, this process of team interaction and reflection is best coordinated by a work-based mentor or preceptor, thereby providing ongoing academic and professional guidance (Kolb, 1984). Examples of programmes from the case studies that utilise work-based team activities in this way include: Management Sciences for Health: VLDP.

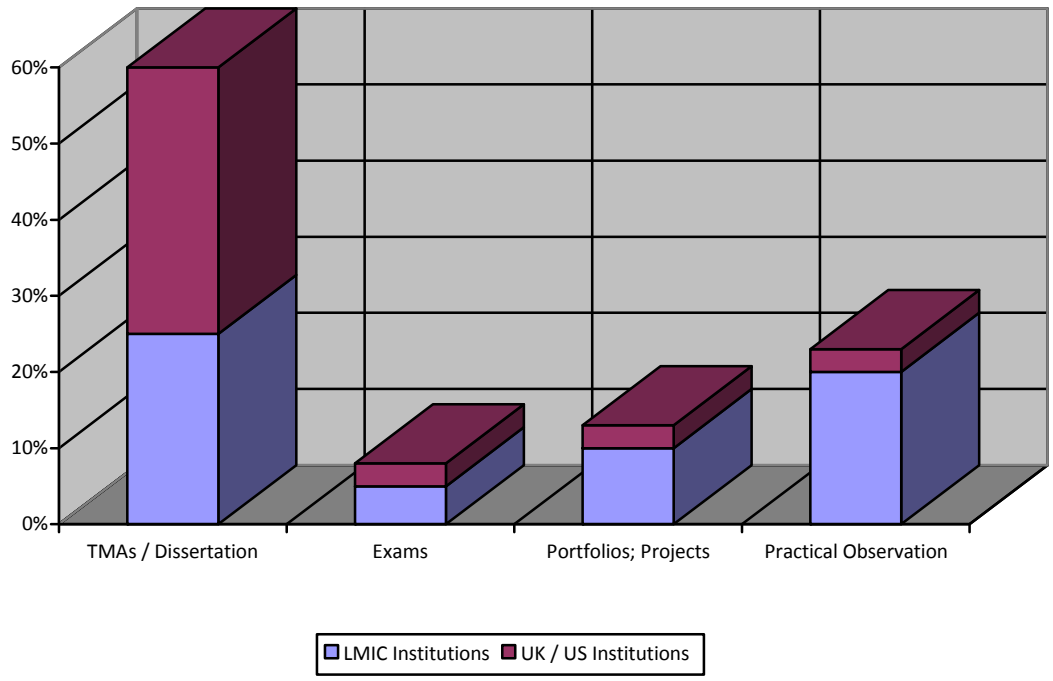
For further info on the distribution of programmes according to face-to-face contact mechanisms, see Annex 3 Matrix 4.

7.3.4. Modes of assessment

In instructional design terms, the modes of assessment employed on distance or blended learning programmes are a means of contributing to the teaching and learning process and of enhancing learner performance. With appropriate design, assessment modes operate as a means of providing additional and personalised study guidance; encouraging reflective approaches to the analysis of professional practice and the work environment; encouraging reflection in the selection and construction of required knowledge and skills; and in guiding the work-based application of new knowledge and practice (Holmberg, 1967; Kolb, 1984) (Moore, 1993).

Within the range of programmes in the case studies, the distribution of assessment modes is as follows:

Table xvi: Distribution of modes of assessment across distance and blended learning programmes (N = 40)



Of the 40 programmes featured within the case studies, 24 rely exclusively on the use of Tutor-Marked Assignments (TMAs) and/ or dissertations as the mode of assessment. Only three used examinations. It is also interesting to note that, while the range of post-qualification programmes on offer here may be best placed to contribute to health systems strengthening through health worker performance enhancement in key competency areas (see Section 3 and Section 4), only five out of 40 programmes use work-based projects or a professional 'portfolio of practice' model, both continuous assessment mechanisms that have the potential to directly contribute to health systems through the development of professional performance among individuals, and the enhancement of service delivery or research mechanisms at the institutional level.

7.3.4.1. Summary analysis of available modes of assessment in the context of learner support

- ***Tutor Marked Assignments (TMAs)***

Within the context of distance or blended learning, the various modes of assessment can make a particular contribution to the learning process. In the first instance, the text-based self-assessment activities and tutor-marked assignments that are a common feature of distance or blended learning programmes represent key stages in the constructivist and cognitive learning process, as set out according to the design principles of Holmberg (1967) and Moore (1993). As such, they contribute to the teaching and learning process by encouraging reflection and analysis on personal practice and the work environment (Brooks, 1999) and providing academic and professional guidance (Kolb, 1984). They are also one element that assists in contributing to the provision of feedback and supervision that is of benefit to health workers (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005). From the case studies, an example of a programme taking this approach to assessment usage is the Open University of Sri Lanka: Continuing Medical Education courses for GPs.

- ***Practical observations***

Practical observations can also be utilised as forms of continuous assessment, and in so doing enhance work-based learning as a training modality (Zmeyov, 1998) by presenting a work-based forum for the application of new knowledge and skills (Merrill 2002), as well as offering a mechanism for the use of interactive and clinically-integrated learning as a training approach (O'Brien et al., 2001). Finally, they also contribute one element in the process of feedback and supervision (Cook et al., 2010a, Dieleman et al., 2006, Horwood et al., 2009, Chaudhury et al., 2005) that is seen to enhance the acquisition and application of new skills and knowledge (Kolb 1984). The application of such approaches in practice is demonstrated by a number of case studies, including: CMC Vellore: PG Dip Family Medicine; University of the West Indies: MSc Family Medicine; IGNOU: PG Dip Clinical Cardiology. It is worth noting that these case studies, as well as many of the other programmes utilising practical observation as a means of assessment, are primarily covering subjects associated with clinical practice in a particular field.

- ***Work-based projects***

Work-based projects and study portfolios are of particular relevance to post-qualification training for health workers, and provide an opportunity for extended reflection on professional practice in the workplace. As such, they enhance the use of work-based learning modalities (Zmeyov, 1998), contribute to the process of discussion, reflection and analysis, particularly in collaboration with professional and academic peers (Wenger 2002; Brooks 1999), and dependent on the design approaches used, contribute to situative and collaborative learning through on-going team work (Wenger 2002).

Importantly, though, examples from the case studies present the work-based project as a mode of assessment that can contribute directly not only to health worker performance enhancement, but also to the strengthening of health systems and health services provision. Project-based learning activities are central to: FAIMER: Fellowship in Medical Education; Management Sciences for Health: Virtual Leadership Development Programme; and CMC Vellore: Fellowship in HIV Medicine. In each case, the project activity is central to the programme itself, and is designed in such a way as to contribute directly to faculty development in terms of either: health systems enhancement in education and training (FAIMER) or management and administration (MSH) or health services delivery (CMC Fellowship).

This approach is seen to be particularly effective as a form of workplace-based learning that can improve educator and institutional performance. Evidence from the FAIMER programme indicates that over half of all its projects lead to changes in educational curriculum and institutional policy towards training (Burdick et al., 2010a). However, it is also important to note two things about these programmes. Firstly, the facilitation of these project components is assisted by individual stipends to learners, themselves funded through substantial donor support. This raises questions over how financially feasible this model is, especially if applied in an unfunded context. Secondly, learners on these programmes either hold relatively senior positions in their respective institutions (FAIMER; CMC Vellore) or are operating in institutional teams (MSH); in all case studies, the learners have the committed support of their institutions. With this in mind, the learners are facilitating the project while a) holding the individual authority to implement change, and b) operating within a receptive work environment. It is questionable whether this model would be as effective if used with low- or mid-level health workers, or without the explicit cooperation of their senior management and place of employment.

For further information on the distribution of programmes according to assessment mechanisms, see Annex 3 Matrix 5.

7.4. Media and technology in distance learning for health workers

The range of media and technology commonly utilised in the delivery of teaching and learning for post-qualification health workers at a distance covers a variety of options, including print, CD-Rom, audio and video broadcast and web-based technologies, as is illustrated by examples of current practice drawn from the case studies.

At a general level, evidence shows that much post-qualification DL for health workers in industrialised countries is currently conducted online (Cook et al., 2008a, Curran, 2010, Hugenholtz et al., 2008). However, in LMICs, access to online resources, even for professionals, is severely limited and expensive (Bbuye, 2008, Mowes, 2005). Within such contexts, and particularly in remote or rural settings, the use of media for open access and home-based learning may be limited to relatively few technologies, primarily print (Perraton, 2007), radio and audio/ video, and telephone (Thurab-Nkosi, 2000, Srivastava, 2008). However, there are exceptions to this trend, demonstrating increasing access to higher end technologies (Brigley, 2009, Mensah, 2010, Kitson-Piggett, 2008).

7.4.1. A note on criteria for the selection of appropriate media and technology in distance learning

In selecting media and technology for use in delivering DL programmes, there are a number of basic criteria that can assist in guiding the process. In the first instance, these include functional and logistical criteria: accessibility, reliability, ease-of-use, and cost of use (Commonwealth of Learning, 1997). The extent to which a particular media fulfils these criteria is measured by a range of contextual factors, including the personal and professional background of the target audience, their location and setting, the work environment, the wider availability of various infrastructure and facilities, and so on. Consideration of these functional and logistical criteria is particularly important when delivering a programme to learners in low-resource settings, as may be the case in LMICs.

In addition to this, though, media and technology should be selected on the basis of the academic function they are designed to provide. While the theory of media equivalence suggests that whatever media are accessible to the target audience can be used effectively to enable learning to take place (Perraton, 1983, Clark, 1983), it is also the case that media differ in the extent to which:

- they can represent different kinds of knowledge;
- they can help develop different skills, due to the representational features of the medium;
- the learner can manipulate the way in which it delivers teaching and learning content (Commonwealth of Learning, 1997 p3).

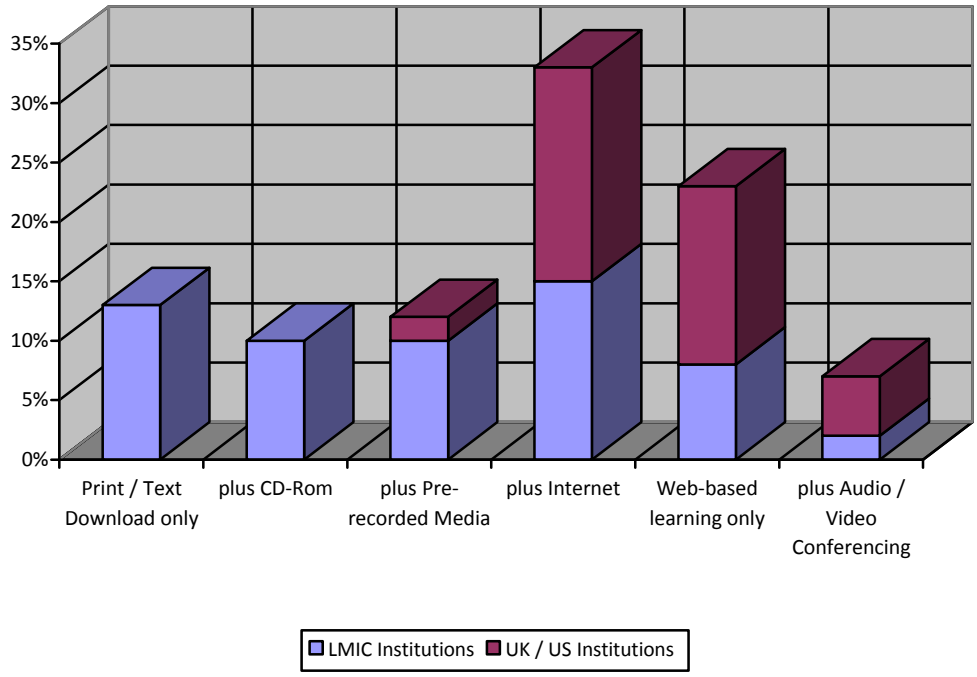
Formalising this within wider approaches to programme design, Laurillard's Conversational Framework highlights the roles that different forms of media can play in promoting particular approaches to the teaching and learning process (Laurillard, 2002), including the range of reflective, interactive and applied modes of learning of value to health worker training at a distance. This theory has had a particular impact on the use of multi-media and blended learning approaches within DL programmes.

For further discussion and analysis of the criteria for guiding the selection of media and technology, see Annex 8.

7.4.2. Current application of media and technology in post-qualification distance learning for health workers in low and middle income countries

Within the range of programmes presented in the case studies, the distribution of media and technologies employed in programme delivery is as follows:

Table xvii: Distribution of media and technology usage across distance and blended learning programmes (N = 40)



Of the 40 programmes featured in the case studies, while five out of 40 use text-based materials and print media only, a further 22 use print media in conjunction with some other form of media or technology, including 13 who use it in conjunction with the Internet. Four out of 40 programmes use CD-ROMs; five out of 40 programmes use pre-recorded media. While nine out of 40 programmes use web-based media as the sole means of programme delivery rather than providing hard-copy packages of learning materials, it is anticipated that they will also give learners the option of downloading and printing text-based materials. Only three programmes use audio- or video-conferencing as a formal means of teaching and learning delivery.

7.4.3. Summary analysis of available examples of media and technology usage

By drawing on examples from the case studies, this sub-section provides a summary analysis of each form of media and technology used in the delivery of DL programmes for health workers, an indication of the teaching and learning functions for which they are used, and an outline of the implications the examples hold for programme design and delivery processes.

7.4.3.1. Print

While it is the least technically-driven of media on offer, it is also the most utilised across the case studies, primarily due to its accessibility, reliability, ease-of-use and relative low cost. While print does present limitations in terms of its ability to facilitate interactive and clinical-integrated learning, collaborative learning or the acquisition of practical skills, it operates primarily as a means of presenting study content and, with appropriate design, it is further able to encourage reflection, analysis and application of new knowledge and practice, and to provide certain levels of feedback and study guidance. An example where this approach is applied is: Open University of Malaysia: Masters Nursing, where featured workbook activities are designed to encourage learners to relate concepts they are studying to their workplace experience and to try out models and techniques in their own working environment.

7.4.3.2. CD-Rom

The CD-Rom is utilised across the case studies as a means of providing a package of study materials and resources in a compact fashion. For example, the University of Ibadan: MSc Biomedical Education provides their study materials via CD-Rom as an alternative to providing a bulky print-based package. In other case studies, CD-Rom is used as an alternative means of providing downloadable materials for individual learners in settings where Internet access is not available, for example AMREF: Nurse Upgrading and CEDH: District Health Management, or as a back-up for print, e.g. UNISA: BA Nursing Science and UNISA: BA Health Sciences Education.

In all case studies using CD-ROM, the implications are that the provider institutions have pass the cost of printing onto learners, should they wish to access the materials in the more familiar form. In addition, there is clearly an assumption in such case studies that the learners have access to computers at work or in the home, and also possess the skills to use them. AMREF: Nurse Upgrading explicitly avoids making such assumptions and takes these factors into account by a) establishing partnerships with NGOs to provide learners with re-conditioned laptops at low or no cost, and b) by providing learners with two weeks of ICT literacy training at the outset of the programme.

Finally, it is difficult to assess from the case studies the extent to which the programmes in question have exploited the potential of CD-ROMs to provide an interactive multimedia package, featuring combinations of text, pre-recorded audio-video, interactive media, hyperlinks to online resources , and so on. On the surface, though, it appears that an opportunity to enhance the self-study process through use of a variety of interactive media is being missed.

7.4.3.3. Pre-recorded audio-video packages

There are few examples of pre-recorded media e.g. audio-cassette, CD, video-cassette, DVD, being used in the case studies, and none of broadcast media. Examples include University of the West Indies: MSc Counselling, where pre-recorded video is used to demonstrate various counselling approaches and patient-doctor interaction, and CMC Vellore: PG Dip Family Medicine, which includes 60 DVDs of pre-recorded lectures. In the first example, video is used as a mode of demonstration or simulated application (Merrill, 2002), and in the second, as a means of replicating the didactic modes of classroom-based education.

As an alternative to this form of media, other programmes provide pre-recorded video online e.g. IGNOU: PG Dip Clinical Cardiology.

7.4.3.4. Web-based technologies

A significant number of programmes from the case studies, particularly those provided by institutions based in the UK/ US use web-based technologies as a means of providing study materials and/ or learner support through various means.

Many of these courses provide email contact with tutors as a means of submitting assignments and receiving feedback, and as a means of accessing personalised study-guidance. Examples of this include: Makerere University: MA Public Health; University of the West Indies: MSc Counselling; Open University of Malaysia: Masters Nursing. The extent of the virtual tutors' role in these case studies is not fully apparent, and in some case studies contact appears as a non-formal or optional component.

However, a significant proportion of courses use Virtual Learning Environments (VLEs) to facilitate a greater range of content provision, comment and interaction in relation to the programme. Such facilities are well-placed to engage and coordinate learners through a range of interactive tasks, including discussions and debates, reflective and analytical study activities, professional and contextual comparisons, and collaborative team work. Examples of programmes that use VLEs with this range of approaches in mind includes: Peoples-uni: Cert/Dip Public Health; Kings College London: Dental Public Health; FAIMER: Fellowship in Medical Education; and University College London: MSc International Primary Health Care.

Finally, some programmes utilising VLEs use them primarily as a means of providing enhanced content for self-study, rather than as a tool for facilitating higher levels of collaborative reflection and analysis of practice. Examples include: UiTM: BA Medical Imaging.

7.4.3.5. Teleconferencing and video-conferencing

Teleconferencing and video-conferencing are not frequently featured within the case studies as a formal mean of learner support or teaching and learning delivery. Case studies include: Cardiff University: MSc Palliative Medicine/ Care; Johns Hopkins Centre for Clinical Global Health Education and University of the West Indies: MSc Counselling. In these case studies, the assumption is that the learners have access to the appropriate facilities at their place of work or in their home.

However, it is worth noting that a number of programmes that are provided by 'single-mode' distance education institutions with extensive and well-established regional centres feature teleconferencing or video-conferencing as an optional supplement, 'where facilities allow'. These include: IGNOU: Pg Dip Clinical Cardiology; IGNOU: BSc Ophthalmic Techniques; UNISA: BA Health Sciences Education; UNISA: BA Nursing Science. In addition, both UNISA programmes are seen to encourage the use of 'personal' video-conferencing via Skype as a means of maintaining regular contact with mentors and tutors.

Telephone

While landline telephone can be used as a formal means of providing academic guidance to distance learners, it is mostly reliant on one-to-one discussion, and is therefore costly in terms of tutor time. For this reason, as a technology, it is less likely to be used as a formal part of the teaching and learning process. However, a significant number of programmes featured in the case studies highlight to learners the fact that they can use the telephone to contact tutors and programme administrators if needs be. Examples include the Makerere University: Masters Public Health, the London School of Hygiene and Tropical Medicine programmes, and AMREF: Nurse Upgrading programme. With this in mind, telephone remains present as a technology in DL, but primarily as a non-formal means of maintaining contact with individual learners and facilitating personal, academic, technical and administrative support when other media or contact components are not seen to work.

Mobile learning – an emerging distance learning technology

While the use of the mobile phone as an educational tool is at a relatively early stage of development, Visser and West illustrate the potential of this device in providing administrative and tutorial/ counselling interventions for students in South Africa (Visser, 2005). Other research projects and pilot programmes have also explored the use of m-learning, and research shows that its use is growing (Gaskell, 2009, Gaskell, 2010, Valk, 2010).

The usefulness of mobile technologies both for administrative support as well as academic and tutorial support is as a result of their immediacy, their intimacy, their portability, and their availability to audiences who do not as yet have ready access to computer-based or on-line technologies. While their use is currently reliant on technological capacity that is currently emerging, this is clearly a technology with huge potential in health worker training by ODL, especially for immediate feedback, guidance and supervision in patient-based practical work, and practitioner examples of their use in health worker training are emerging (Zachariah, 2004, Owen, 2009).

Section 8: Evaluating the evidence of impact of DL4H on health worker performance and wider health outcomes

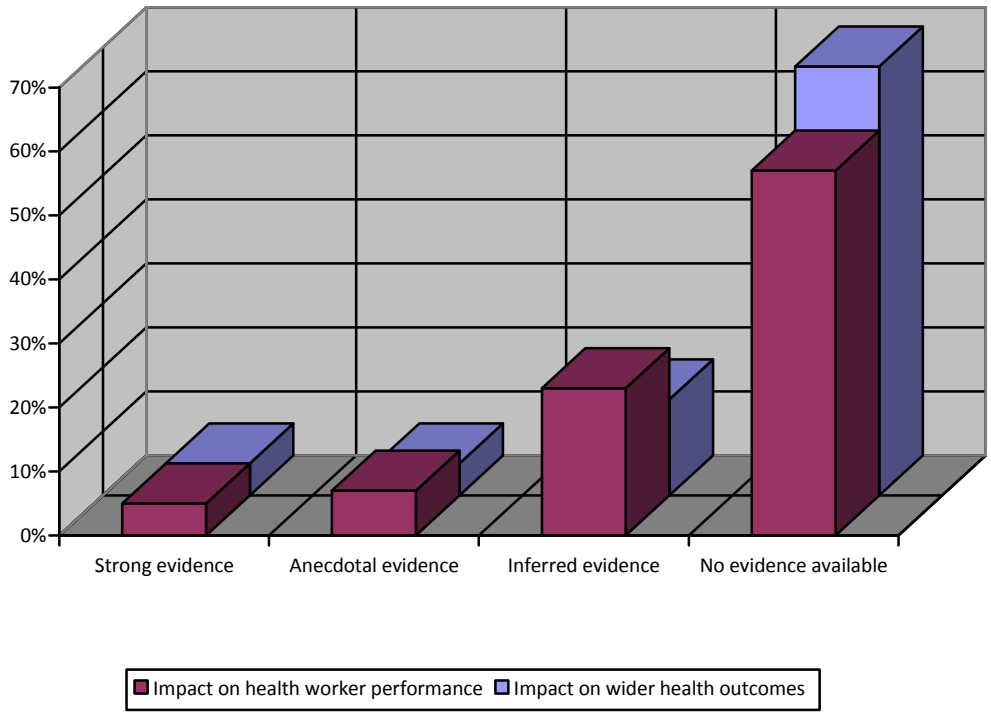
8.1. Introduction

This section summarises the available evidence of impact of DL4H on health worker performance and on wider health outcomes, including health systems strengthening, by drawing on the evidence from the case studies. This section will also provide a summary overview of some of the common methods used to assess programme impact in DL4H particularly those used by provider institutions, and highlight some of the issues arising from this. The section will conclude with a brief analysis of how new approaches to the evaluation process might result in an improvement of available evidence of impact.

8.2. Assessing the quality of available evidence

The various forms of evidence of impact associated with the programmes featured in the case studies were analysed according to the nature of the evidence presented in relation to two areas for evaluation: a) programme impact on health worker performance; b) programme impact on wider health outcomes (including health systems strengthening). The results are grouped as follows:

Table xviii: Distribution of programmes according to quality of evidence (N = 40)



The findings for both areas are discussed in more detail in Sections 8.2.2 and 8.2.3, below. For further details on the evidence of impact associated with specific programmes, please refer to Annex 3, Matrix 6.

8.2.1. Note on the availability of evidence

The evidence of impact assessed here was gathered in relation to each of the programmes included in the case studies. It was gathered primarily through information available in the public domain (websites, journals, publications, conference proceedings etc.); or through documents acquired as a result of established contact with the programme providers. In a small number of case studies, the information was gathered and provided to the review by the programme providers specifically in response to the review's request. However, as can be seen from the graph above, many programmes do not have evidence of impact available for this review to present. This may be due to a number of reasons.

Firstly, the evaluative process is a complex and challenging one, and from a practical perspective many institutions may not have the time, resources or expertise to design and conduct a thorough evaluation of programme impact. As Grant (1986) identifies, there are numerous issues associated with evaluative theory that serve to confuse those approaching the process: there is an apparent lack of true theory which has arisen out of the practice of curriculum evaluation and in turn informs its practice and is altered by it; in addition, there are few obvious criteria to apply when trying to select an appropriate theory or model for practice, or for selecting evaluative methods. There is also a noted tendency among programme providers to regard the evaluative process as something that is external to the programme delivery process, to be funded independently from programme design and delivery, to be undertaken on completion of all programme delivery inputs, and possibly to be undertaken by an external institution (Joynes, 2010).

Secondly, as discussed in Section 5, DL4H is a relatively recent phenomenon. In keeping with this, a significant number of programmes featured in the case studies are relatively young, with 18 out of 40 programmes commencing since 2007, eight of which have not produced a full set of graduates. In this context, many have not had the opportunity to undertake a full evaluation.

Thirdly, provider institutions may be reluctant to share information publicly. In some case studies, the evaluative data is restricted due to issues of confidentiality, particularly among those evaluations that relied on student surveys and commentary. In other case studies, the provider institution regards the programme in question as an educational product in which it has invested time, money and expertise to ensure commercial and academic success. In this context, evaluative information is regarded as important feedback that assists in improving delivery and ensuring the programme's on-going success, and therefore the institution may be reluctant to share it among other providers in a similar field.

Fourthly, the review was unable to established contact with a number of provider institutions, and was therefore unable to obtain detailed information unavailable in the public domain. Of all the areas of information included in the case study template, evidence of impact was the least likely to be accessible without establishing personal contact with the provider institute.

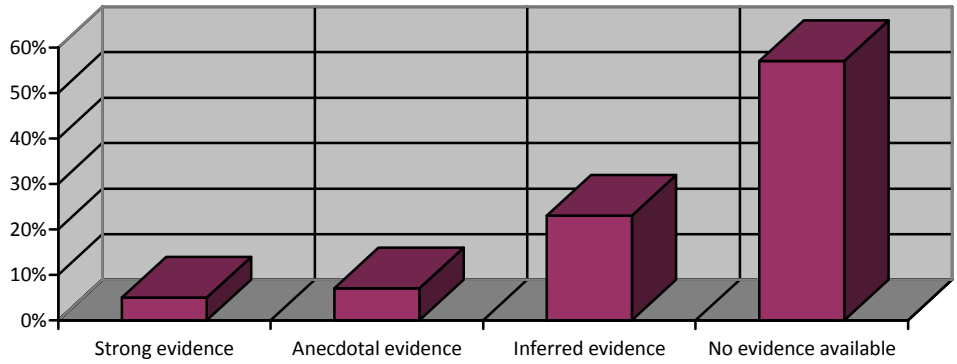
Finally, the data was gathered on a case-by-case basis, and does not take into account the forms of evidence that may have been gathered independently from the programme funders and provider institutions themselves. With this in mind, it should be acknowledged that the information assessed here does not necessarily form the entire range of evidence of impact on each case, and that further evidence of impact is likely to be available through other sources in relation to a number of the case studies featured here.

8.2.2. Evidence of impact on health worker performance

The evidence of programme impact on health worker performance across all 40 programmes featured in the 37 case studies was analysed and evaluated according to the nature of the evidence presented. The results are grouped as follows:

Table xix: Distribution of programmes according to quality of evidence of impact on health worker

performance (N = 40)



'Strong evidence' relates to programmes that have undertaken a rigorous evaluation process involving several approaches to data collection related to improvements in health worker performance, skill and knowledge or changes in professional behaviour, including learner surveys, site visits, work-based performance monitoring, post-graduation follow-up etc. Of the range of evidence of impact available to this review, two out of 40 programmes presented evidence matching this category.

'Anecdotal evidence' is defined here as data based on reported improvements in health worker performance, skill and knowledge or changes in professional behaviour. Three out of 40 programmes presented evidence matching this category. This data can fall into two sub-categories: Firstly, there is data where programmes have gathered evidence of impact on the basis of reported changes in professional behaviour and/ or ability, as observed by line managers, employers or professional mentors; one of the 40 programmes matched this category. Secondly, there is data where programmes have gathered evidence of impact on the basis of reported changes in professional behaviour and/ or ability, as reported by graduates themselves through follow-up questionnaires and/ or interviews; two programmes match this category.

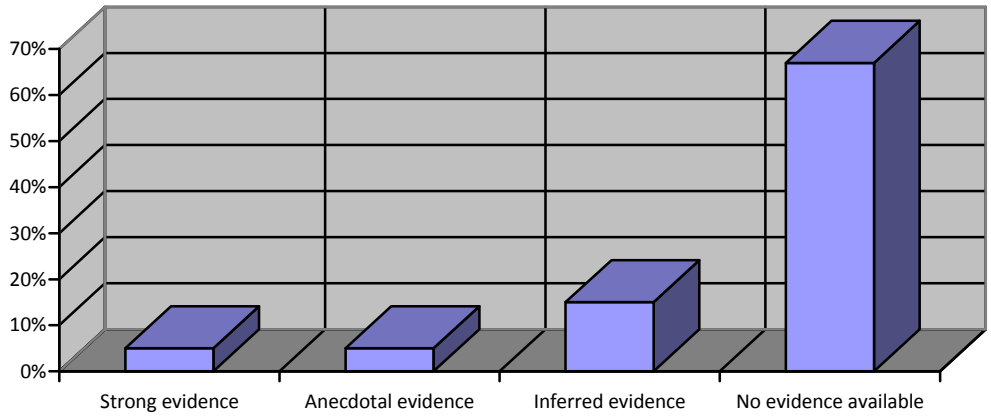
'Inferred evidence' is defined here as data where improvements in health worker performance, skill and knowledge or changes in professional behaviour are assumed, on the basis of reported learner achievements at the academic level. For example, this would include assumed evidence of impact on the basis of successful completion of a programme with specific performance-related objectives, or on the basis of reports from learners identifying what they have learnt as a result of the programme. Nine out of 40 programmes presented evidence matching this category.

'No evidence available' is used here where programmes had no evidence of impact to present, or instead presented information from which improvements in health worker performance or behaviour change could not legitimately be inferred. This includes, for example, data regarding learner satisfaction with programme content, design and delivery, or evidence of improvements in academic skills. 26 out of 40 programmes matched this category; 24 had no evidence available; two presented evidence from which improvements in health workers performance could not be legitimately inferred.

8.2.3. Evidence of impact on wider health outcomes

The evidence of programme impact on wider health outcomes, including health systems strengthening, was analysed and evaluated according to the nature of the evidence presented. The results are grouped as follows:

Table xx: Distribution of programmes according to quality of evidence of impact on wider health outcomes (N = 40)



'Strong evidence' is defined here as data gathered where programmes have undertaken a rigorous evaluation process involving several approaches to data collection related to evidence of impact on wider health outcomes, including learner and patient surveys, site visits, work-based service assessments and performance monitoring, post-graduation follow-up etc. This includes, for example, evidence of impact where learners have established new systems or practices in their workplace as a direct result of the programme, e.g. through work-based project activities; or evidence of impact where the facilitation of new services or performance techniques instigated by the programme are seen to be influencing improvements in patient healthcare and in related trends in community health. Two out of 40 programmes presented evidence of impact on wider health outcomes matching this category.

'Anecdotal evidence' is defined here as data based on reported improvements or additions to local health systems, institutional services, patient healthcare and/ or community health, gathered from learners themselves or from line managers, employers or professional mentors. Two out of 40 programmes presented evidence of impact matching this category.

'Inferred evidence' is defined here as data where improvements in wider health outcomes, health systems strengthening and health service delivery are assumed on the basis of increased numbers of successful graduates, i.e. health workers with enhanced knowledge and skills, operating within the health system, or increased numbers of patients receiving treatment as a result of health worker scale-up. Six out of 40 programmes presented evidence of impact matching this category.

'No evidence available' is used here where programmes had no evidence of impact to present, or instead presented information from which a contribution to wider health outcomes could not legitimately be inferred. Thirty out of 40 programmes matched this category.

8.3. Issues associated with providing evidence of impact in distance learning for health workers

In reviewing the evidence of impact for individual programmes represented by the case studies, as a whole,

the evidence for assessing the impact of specific training inputs on health worker performance, on the strengthening of health systems and on the attainment of wider health outcomes, is scant. This is in keeping with the commonly experienced difficulties involved in providing comprehensive evidence of impact among post-qualification health worker training programmes (Joynes, 2010).

Much of the literature evaluating the impact and effectiveness of post-qualification training for health workers is related to continuing education or programmes for continuing professional development (CPD). There are few studies looking at postgraduate or post-qualification programmes that lead to a formal certificate, diploma or degree. In addition, very little has been published regarding the impact of education and training on health worker competencies, health systems performance and wider health outcomes, and even less has been published on the impact of DL modalities in the training of health workers.

8.3.1. Gathering evidence of impact of training on health worker performance

In gathering evidence for impact of training on health worker performance, programme evaluation methods frequently include periodic student surveys to determine the level of learner satisfaction with the programme content, delivery, teachers, materials and support and obtain suggestions for improvement. This is particularly the case with evaluation undertaken by provider institutions. Some programmes may also follow up with students upon completion to examine the relevance of acquired knowledge and skills to their work, and how their professional practice has been influenced by the programme.

For example, a recently published evaluation of the FAIMER Fellowship for international health professions faculty surveyed fellows to complete retrospective pre and post questionnaires on the importance of curriculum topics, and rate their competencies in each curriculum topic (Burdick et al., 2010b). FAIMER fellows also participated in individual structured interviews to identify which new competencies they had used; examine their interaction with other fellows; and examine the impact of the fellowship on their leadership and peer interaction. Significant increases in retrospectively reported pre and post competency levels were found across curriculum topics covered by the fellowship. In another example, evaluation of FAIMER/World Federation of Medical Education/Open University DL resources for medical education obtained post-module feedback on the learning experience, learning process, community and support, relevance, workload, and sought feedback on programme highlights and areas for improvement (Owen, 2010).

8.3.2. Gathering evidence of impact of training on wider health outcomes

In terms of evidence of impact of training on wider health outcomes, a 2005 literature review classifying evaluative outcomes reported of web-based continuing medical education, found that most of the data gathered in this field was limited to an assessment of patient satisfaction, with few studies examining changes in performance (Curran and Fleet, 2005). A 2010 review of 38 papers published on the effectiveness of training on emergency obstetric care in low-resource settings found similar patterns, with few assessments of impact on outcomes (van Lonkhuijzen et al., 2010).

8.3.3. Gathering evidence of impact in distance learning training

The field of DL in higher education has also suffered from weak research. Phipps and Merisotis' (1999) criticism of DL research concluded that: '(1) research focused on learner outcomes for individual courses rather than entire academic programmes; (2) research did not take into account personal differences amongst learners; (3) dropout rates for distance education were higher and not explained; (4) research did not account or measure different learning styles; (5) research did not look at the impact of using individual technologies versus the interaction of multiple technologies; (6) research did not include a theoretical or conceptual framework; (7) research did not adequately address the effectiveness of the use of digital libraries and their potential limitations' (cited in Olmsted, 2010b).

8.3.4. Issues arising

As the case studies demonstrate, the majority of programme evaluations are usually conducted by the provider institute. Evaluations designed and implemented by the provider institution can have an influence on the type of information that the evaluation seeks to gather. Evaluations led by those responsible for the design and delivery of a programme, particularly in the case of educational institutions who are providing a programme on a commercial basis, may be primarily concerned with gathering information that can assist in ensuring overall learner satisfaction with the quality of content and the quality of the services provided. Evaluations led by programme funders are often interested in demonstrating programme achievements through scale i.e. the numbers of health workers trained, rather than through evidence of the quality of impact (Joynes, 2010). With this in mind, the role and interrelationships between the participants in an evaluation study always require negotiation and definition (Grant, 1986).

While such modes of information and information-gathering can provide anecdotal indications of impact, as a rule there is a very limited basis for making reliable inferences about programme impact on health worker performance and wider health outcomes using this type of information. At their worst, such evaluative evidence can be reduced to learners re-stating the general learning objectives for a particular programme, with no evidence or illustration of practice to support them.

Further to this, evaluative methods employed in many studies of health worker training, particularly those provided at a distance, are not able to attribute causality to training and education interventions due to weaknesses in their design, frequently using simplified pre- and post-test evaluations that overestimate causality to the intervention. The targets of any evaluation study in education, whether for assessing resultant improvements in health worker performance, in health systems strengthening, or in attainment of wider health outcomes, are themselves problematical, being complex, multifaceted, numerous and reliant on numerous parallel inputs (Grant, 1986). Even where comprehensive evaluation methods have been used, the evaluations themselves have been conducted with small sample sizes. In such case studies, there is a great need for larger scale and more rigorous impact evaluations.

As an illustration of these concerns, a small study in 33 facilities in Kenya, evaluating the effect of a three-day in-service training input plus exposure to job aids on the management of paediatric fevers (to improve malaria case management) found no significant improvements in reported case management tasks (prescribing, dispensing, counselling) compared to baseline (Wasunna et al., 2010). Whilst there were modest (though non-significant) improvements in case management tasks between 2008 and 2009, this was attributed not only to health workers who had received training.

In looking at this case, there are important elements to consider that may confound evaluative results of findings, as the possibility for spillover effects is significant. For example, the presence of a trained health worker in any given facility may have a positive influence on the performance on their colleagues. The training design features of the three-day course were also unclear, in terms of the balance between didactic teaching, interactivity and clinical integration inputs. These features had been shown in previous studies to influence performance, yet these effects were not accounted for in the study design. Furthermore, only 48 health workers and 386 child consultations were evaluated, and thus the study does not have adequate power to detect changes in performance.

In essence, the evidence base in health worker training remains weak, especially so within DL4H. Impact evaluation procedures frequently have significant methodological flaws and limitations which limit conclusions that can be drawn regarding the impact of education and training, and indeed DL, on performance and health outcomes.

8.4. Conclusion: issues for consideration in designing evaluations of training effectiveness

Very little has been published regarding the impact of education and training on competencies, performance and health outcomes, and even less on the impact of DL modalities. Weaknesses in DL research relating to research design and attribution have been observed more generally in the higher education literature. These flaws limit conclusions that can be drawn regarding the impact of education and training, and indeed DL, on performance and health outcomes.

However, the generally observed weaknesses in evaluative evidence are not surprising given the complexity of appropriate evaluation design, the range of confounding factors, the lack of adequate evaluation skills amongst programme providers, the small cohorts (thus small sample sizes), the lack of follow-up with learners, and the lack of resources for comprehensive evaluation. There are clearly issues that need to be addressed in both the design and implementation of evaluations of programmes of training for health workers. Many of these were raised during the DL4H International Worksop. The main points made include the following.

8.4.1. Evaluation within programme design

Evaluation should firstly be regarded as a core component of programme design, and responsibility for incorporating and undertaking this should rest with the provider institute as part of expected programme outputs (Joynes, 2010). As one small example of the way in which evaluative procedures can be incorporated into the overall programme design and delivery process, the modes of formative and summative assessment used within the programme, such as self-assessment activities, TMAs, projects, workbooks, practical and theoretical examinations and so on, can contribute to an integrated and from-the-outset mode of evaluation (Ibid).

8.4.2. Evaluation of programme inputs alone

In evaluating training impact on clinical and professional practice and professional and careers development, it is hard to prove any directly causal relationship between performance enhancement and specific training inputs. Training inputs can help raise professional preparedness among individuals, but the contribution made may not be measured in terms of resulting problems solved. External factors such as policy change and resource enhancement need to be taken into consideration (Joynes, 2010). With this in mind, evaluation should be based on a desire to understand local cultural and professional context, and to understand the influence that those factors can contribute to learner attainment and to the overall success or otherwise of programmes (Kushner, 2010). The design of the evaluative process should recognise that the indicators for success are wholly project-dependent (Joynes, 2010), and should be selected in such a way as to acknowledge those influential factors that are ‘external‘ to the programme delivery process.

8.4.3. Evaluation of programme processes

As an example of the type of evaluative design matters to consider when measuring the impact of training on health worker performance, a focus on educational outcomes should not crowd out attention to the education process itself. As espoused by adult learning theories, outcomes and processes should be seen as a continuum in which theoretical approaches to education and training design are important elements that influence training effectiveness (Milligan, 1997). A conceptual framework proposed by Olmsted for the development, implementation and evaluation of DL integrates three overlapping considerations for the preparation of health professionals: adult learning theory, constructivist theory and performance outcomes (Olmsted, 2010b). Evidence suggests that a mix of synergistic pedagogic approaches is required to improve learning effectiveness (Khan and Coomarasamy, 2006), and evaluation processes should take account of this.

8.4.4. Evaluation of programmes within the context of other systemic inputs

Post-qualification training for health workers is seen as most effective at enhancing performance when delivered in conjunction with parallel inputs for systems strengthening (World Health Organisation, 2006). In addition, questions remain on the effect of training over time and whether positive effects are sustained or decline. These are critical questions with respect to institutionalising performance and achieving the final stage of training effectiveness in Kirkpatrick's model (see Section 4.3.) where changes in health outcomes can be observed. Such questions need to be considered in the design and implementation of education and training programmes. The improvement and maintenance of performance cannot reasonably be attained through training and education interventions alone, thus raising the need for other supportive strategies to improve practice (Flores et al., 2002, Amaral et al., 2005). With this in mind, programme evaluation should also take into account the presence of wider systemic factors that may have enhanced the improvement of health worker performance, or alternatively, hindered the effectiveness of particular inputs.

8.4.5. Evaluation of education and training as the most suitable input

It is also important to consider whether education or training based approaches are in fact appropriate to the particular scenario in which gains in health outcomes are envisioned. In many situations, other approaches to health systems strengthening may be more likely to result in improvements in health outcomes. Even with well designed education and training programmes, gains in health outcomes may not be realised through these alone. For example, a distance education programme on diarrhoea and cholera case management in Guatemala improved correct diagnosis by 25%, however only 60% could diagnose correctly, thus raising the need for other supportive strategies to improve practice (Flores et al., 2002). In another example, variation in the extent of the coverage of Integrated Maternal and Childhood Illnesses (IMCI) intensive 11-day training programmes on algorithms and treatment guidelines in different regions in Brazil found no attributable improvements on infant mortality (Amaral et al., 2005).

8.4.6. Considering the evaluative design process

For those individuals and institutions seeking to commence the process of evaluative design by taking the issues outlined above into consideration, Grant (1986) suggests that the design process should do the following:

- 'set out the issues associated with each stage of planning and implementation of evaluation medical education, including the stage of reporting;
- clarify the relationship between the sponsors, subjects and implementers of evaluation studies;
- identify the extent to which a curriculum evaluator should also be a curriculum content expert;
- consider the potential roles and lines of accountability associated with formal participants in an evaluation study and the implications of these for practice;
- analyse the relationship between curriculum evaluation and curriculum development;
- identify any special qualities of medical education which might impinge upon the evaluation process. This might include the instructional system, the learning milieu, and the medical school academic, administrative and organisational environment;
- address questions of contradictory value systems which might impinge upon an evaluation study and consider whether these are antagonistic or non-antagonistic in nature;

- review the implications of the above factors for appropriate methodology in the evaluation of medical education, including the education of audiences about evaluation;

- provide a critical analysis of available methodologies and suggest criteria for their selection and use.'

The extent to which these guidelines can operate to address all evaluative concerns regarding the specificities of DL for health workers is unclear. However, they do serve to provide an introductory set of approaches to employ in the evaluative design process.

8.4.7. Approaches to developing guidelines for the evaluation of DL4H

There are many questions relating to distance education for health workers and their impact on health worker performance and health outcomes which the literature does not adequately address. Among the most prominent are the following which, it is argued, should form the basis of discussions regarding evaluation design and the evaluation of DL4H programmes as a whole.

1. To what extent can educational approaches alone contribute to improvements in performance and health outcomes?
2. What differences in the effect size of combined approaches to health worker performance improvement and health outcomes improvement can be expected as compared to stand-alone educational approaches?
3. What factors coupled with distance education can contribute to behaviour change among health workers from competencies to performance?
4. What factors coupled with distance education can support performance institutionalisation?
5. In which specific circumstances can DL approaches be more effective than face-to-face approaches?
6. Are positive effects on competence, performance and health outcomes as a result of DL sustained over time? Why or why not?
7. How cost effective is distance education in comparison to face-to-face education approaches?
8. What is the impact of scaling up distance education on quality of education and educational outcomes?
9. Which aspects of health systems strengthening could be effectively improved through distance education approaches?

The complexity of such questions gives some indication of why it is so difficult to gather evidence of programme impact on learner knowledge; on learner practice; on health systems enhancement; and on wider health outcomes. These questions have not been resolved by the literature, and continue to form the basis of ongoing debate among DL4H among practitioners and policy makers alike. While direct answers to these questions are not available to present here, they do provide a summary of the issues that need to be taken into consideration when trying to gather, process and draw conclusions from data in this field. As such, a focus of future attention and the undertaking of systematic reviews in relation to these questions would be a welcome addition to the current evidence base.

Section 9: Summary Conclusions

9.1. Introduction

This section uses the findings set out in the various sections of this report to draw some general conclusions about the use of DL4H in LMICs. First, it identifies current priorities and approaches to the training of health workers, and then outlines the extent to which such training is currently delivered through distance or blended mechanisms, based on the evidence from the case studies. Drawing on the case studies and other available evidence, it then outlines some general approaches to programme design and delivery of relevance to DL4H. The section concludes with a summary of the further implications raised by these findings.

9.2. Priorities and approaches to health worker training in low and middle income countries

The priority areas in health worker training for LMICs identified in global policy and strategy include the need for:

- scale-up in the health workforce, particularly in health workers providing services at the community level;
- enhancement of services in key areas related to the UN Millennium Development Goals, particularly Maternal and Child Health, Malaria and HIV /AIDS;
- enhancement of the specialist skills for those delivering services in these areas;
- strengthening of health systems to coordinate and manage the delivery of health services;
- investment in education and training capacity in order to facilitate this (see Section 2).

In approaching the strengthening of health systems, whether at the national or global level, it is important to regard health worker training as one intervention among several, best delivered in parallel with related inputs across a range of areas including investments in service delivery mechanisms, HR management, health research and information gathering, new medicines and technologies, and sector-wide leadership and governance (World Health Organization, 2007). Without such parallel investments contributing to the creation of a supportive working environment, programmes of training for health workers are unlikely to provide sustained improvements in health worker performance in the workplace (see Section 3.2.)

Within this framework for health systems strengthening, there are a number of health worker competencies that need to be addressed to ensure sector-wide improvements. These include management (including supply and procurement), research, education and training, primary healthcare, and specialist medical skills (see Section 3.3).

In working to develop health worker competencies, the basic modes of delivery for performance improvement in the post-qualification training of health workers include a significant number of components that, at some level, are based around learner engagement with the professional working environment. These include, for example, work-based learning; community-based learning; interactive and clinically integrated learning; interdisciplinary learning; applied simulated learning; and clinical supervision (see Section 4.4.). The GHWA sees a model for training where health workers in LMICs are educated and trained at the national level by higher education institutions, in a regulated system that includes modules taught 'in the community as well as in the classroom' (World Health Organisation, 2008e). Community-based education for health workers contributes towards ensuring that the mode of training and the skills acquired are better suited to the health needs of the population (World Health Organisation, 2010).

9.3. The role of distance and blended learning in health systems strengthening and facilitating improvements in health worker performance across priority competency areas

At a general level, as a mode of training delivery, DL can contribute to health systems strengthening and improvements in health worker performance through its capacity to a) overcome various constraints associated with educational access and institutional capacity; b) facilitate guided academic study while learners continue to engage with their professional activities and working environment on a daily basis (see Section 5.2.1.). These properties give DL the potential to contribute to health systems strengthening through facilitating scales of training required to meet the required expansion of the health workforce in LMICs, and also through exploiting its 'work-based' delivery mechanisms to enable applied professional development to take place in direct response to localised systematic requirements. Closely related to this second point, DL has the potential to contribute to individual improvements in health worker performance because its primary characteristics enable the applied and clinically integrated learning approaches seen to benefit health workers in particular.

However, it is important to note that in enabling such objectives to be met at the programme level, DL also relies on institutional providers having a detailed understanding of the personal and professional needs and circumstances of learners; working to ensure the academic and professional relevance of their programmes; and investing in resources and expertise to provide appropriate standards of instructional design and logistical support (see Section 5.2.2.)

DL programmes are also valuable as part of a 'blended learning' mode of delivery, where independent self-study is supplemented by traditional applied and clinically integrated learning approaches based on face-to-face contact between learners, peers and mentors. This is illustrated by the range of programmes presented in the case studies for this review, where 27 out of 40 programmes feature some form of face-to-face contact, and a further 12 out of 13 operate under the principle that their learners are engaged as professional health workers at the time of study (see Section 7.3.1.). Further to this, in fulfilling GHWA's vision for health workers to be trained by higher education institutions via the community, 29 out of 40 programmes are delivered by universities or tertiary medical colleges (see Section 6.4.).

9.3.1. Programme design and delivery models

With this in mind, it is difficult to discuss in any detail the value of the range of teaching and learning approaches and programme delivery mechanisms currently employed by the programmes featured in the case studies, or to identify examples of best practice. However, in terms of delivery patterns, at a general level, the case studies support the contention that it appears increasingly redundant to describe post-qualification programmes for health workers strictly in terms of 'distance', 'blended' or 'face-to-face' modes of delivery (Maraj & Mugridge, 1992, King, 2006, Naidoo, 2004), due to the ways in which these range of modes are being combined by institutional providers to enable increasingly flexible modes of study to suit the individual needs and circumstances of learners.

Further to this, and dependent on circumstances, the range of case studies show there is both the potential for combining face-to-face or virtual contact and supervision with units of reflective self-study and work-based practice (see Section 7.3.), and value to be found in doing so (see Section 4.4.) With this in mind, it is less the programmes that can be analysed in terms of 'distance', 'blended' or 'face-to-face' delivery modes, and rather the range of teaching and learning components that make up each programme. The proviso is that the range of teaching and learning components that a programme offers, regardless of the delivery mode, should provide learners with:

- adequate opportunities for reflection, analysis and discussion, particularly in collaboration with professional and academic peers (Wenger, 2002, Brooks, 1999);

- adequate procedures offering both academic and professional guidance, through tutors, mentors and preceptors (Kolb, 1984);
- work-based forums for the application of new knowledge and skills, through:
    - skills demonstration sessions (Merrill, 2002)
    - work-based practical sessions
    - ongoing team work (Wenger, 2002) (see Section 7.2.).

Further to this, there is also evidence to suggest that programmes employing project-based activities within the instructional model, to be designed and implemented by learners in the work environment, are more likely to have an impact on health worker performance in their specific field, health systems strengthening at the institutional level, particularly in terms of service provision, and wider health outcomes in the community (see Section 7.3.4.).

While the range of components listed above offer numerous options for combination in programme design, in general the examples featured in the case studies follow a relatively simple formula that is best illustrated by the OUUK's model of Supported Open Learning:

> 'The Open University's style of teaching is called 'supported open learning' (SOL) also known as 'distance learning' (Tait, 2003; McAndrew and Weller, 2005). 'Open learning' means that students learn in their own time by reading course material, working on course activities, writing assignments and perhaps working with other students. 'Supported' means support from a tutor and the student services staff at Regional Centres, as well as from centralised areas such as the Library or Open University Students Association…'
>
> 'The OUUK SOL model is described as being based on three factors:
>
> - distance or Open Learning (learning individually through readings, activities, assignments, and working with others);
> - resources (course texts, DVDs, home experiments, interactive materials, TV programmes);
> - systematic support (via an allocated course tutor, assignments to one of 13 regional centres, central library and IT support, plus regional tutorials, day schools and online support)' (Conole, 2010b).

To this basic three-part model, in the context of post-qualification training for health workers, the programmes featured in the case studies add a fourth factor – placement in a professional health environment, supported through opportunities for work-based interaction and supervision.

The case studies use a range of media and technology to fulfil various teaching and learning functions. The indications are that most media and communications technology is able to replicate over a distance the majority of reflective, discursive and demonstrative training inputs of benefit health workers. In particular, web-based communications mechanisms appear to be particularly valuable to programmes with isolated or widely dispersed cohorts of learners as a means of providing forums for ongoing study guidance and exchanges of experience and knowledge, although questions remain about the feasibility of using them on programmes where learners and provider institutions are based in low-resource settings. The only exception to the general range of teaching and learning possibilities that can be provided through distance technologies appears to be the regular professional interaction with the working environment, a key component of health worker training that is reliant on programme provider institutes working in partnership with health institutions to ensure the benefits are felt.

With this in mind, for DL programmes for health workers in LMICs, the process of identifying media and technology according to suitability is therefore determined less by issues of academic functionality, and more by other contextual criteria, such as relative accessibility, reliability, ease-of-use and cost, both to institution and learner (see Section 7.4.).

However, in all case studies, the precise contribution that each of these components makes to the teaching and learning process in distance learner for health workers has yet to be fully determined. In addition, the ability of these components to provide the required range of teaching and learning inputs and learner support depends in part on appropriate design at the level of the programme and the materials, and in part on clarity over objectives and procedures for application, as well as clarity of the roles and responsibilities of learners and facilitators alike.

The practicality of WebCTs

The distribution of media and technologies described here give some indication of the growing popularity of web-based communications as a means of facilitating teaching and learning at a distance. However, an interesting feature that emerges from these examples, particularly those from provider institutes in LMICs, of the continued use of more traditional media such as pre-recorded audio/ video, telephones and print. Requisite investments in ICT infrastructure and electricity are necessary for e-learning, and whilst this is an area of growth in LMICs, questions have to be asked about the feasibility of using such technologies for teaching and learning at a distance in low- resource settings. While it is not possible to judge the effectiveness of such technologies as used by the programmes featured in the case studies, this review as already noted the general lack of facilities and equipment available to medical schools in sub-Saharan Africa (see Section 3.2.1.). The same restrictions are seen to apply with regard to communications technology in particular: at Jimma University, Ethiopia, power and telecommunications are described as 'unreliable'; at Ibadan University, Nigeria, (see case study) there are daily power outages and departments have to purchase generators; at Catholic University, Mozambique, there are insufficient computers and a restriction on internet connectivity (Mullan et al., 2010a). The current scenario may pose challenges to the scalability of e-learning approaches. It might be assumed that if such restrictions exist at the provider institutes, it is highly likely that they are intensified for the isolated, non-urban settings in which a significant proportion of learners on national DL programmes are likely to be based. Technology infrastructure and Internet bandwidth may limit the use and application of these in some low and middle income country contexts, and mechanisms need to be put in place to ensure quality of content (Boulos et al., 2006). At a regional or local level, the deficit in information technology and bandwidth is denying learners the possibility of benefiting from the rapidly advancing developments in Internet learning (Mullan et al., 2010).

9.3.2. Evidence of impact

Beyond the general trends identified above, the actual contributions of DL programmes to health systems strengthening in identified priority areas is currently open to question, both in terms of the scale and range of programmes on offer, and also in terms of the available evidence of their impact on health worker performance and wider health outcomes.

Firstly, in terms of the scale and range of current programmes, with the exception of two or three unique examples, the programmes featured in the case studies are currently not contributing to the up-scale in the

health workforce in any way that can be seen to be approaching the required numbers identified by global health strategists. Twenty out of 40 programmes have enrolments of less than 100 students per year, and the majority have enrolments of fewer than 200 students per year (see Section 6.3.). The implications are that the restrictions on numbers created by limitations in institutional capacity, whether among the provider institutions or their clinical partners, continue to apply to DL programmes as well as conventional campus-based programmes.

In addition, the range of case studies provide only limited examples of programmes explicitly addressing the identified priority areas for health, priorities such as Maternal and Child Health, Newborn and Infant Care, HIV /AIDS, and Malaria. However, in addressing the identified priorities for health worker competencies, there is a good selection of programmes for primary healthcare; a reasonable selection of examples of programmes for both management and education and training; but a limited selection of programmes addressing specialist medical skills; and none at all explicitly addressing health research as a discipline (see Section 6.5.). This indicates some mismatch between what is required from DL4H and what is currently available.

Secondly, in terms of the available evidence of impact of existing programmes, it is difficult to provide substantial proof of the contributions they have made to health systems strengthening, either through improvements in health worker performance or subsequently to the attainment of wider health outcomes. As the case studies have shown, many programmes are still young and this limits the availability of information to inform studies on impact. However, even with those programmes that are well-established, there is often no substantial evidence currently available, or the evidence presented does not actually address issues of performance or wider health outcomes. This is a common situation encountered across health training in general, not just in relation to DL. The process of impact evaluation in health training is complex and demanding, and should take into account the range of additional factors that can influence both the professional environment and health services provision: this is particularly pertinent in light of the sector-wide approach to health systems strengthening advocated for by the WHO Health Systems Framework 2007. Current indications are that many provider institutions do not have the capacity or time to undertake a substantial evaluation design and delivery process and that, additionally, there is a lack of clear guidelines for those wishing to evaluate the impact of training on health worker performance and wider health outcomes (see Section 8). Improvements are needed to both the evaluation mechanisms and the range of available data, before a full judgement can be made regarding DL4H.

9.4. Further implications

A review of the literature and documents associated with existing DL4H courses suggests that certain features are widely accepted as essential for the successful design and delivery of DL programmes for health workers in LMICs. Planning for DL4H professionals must take account of:

- available, usable and sustainable technology;
- systems and managerial tools which improve the performance of students, health workers and trainers and educators;
- established structures of communication and information sharing across health systems;
- establishing advice and support systems, including technological support systems.

(World Health Organisation, 2001)

Further to this, a number of general design principles can be drawn out when developing a DL programme for health workers.

These would include:

- a clearly defined programme of study relevant to the clinical and managerial realities of any given health system;
- a syllabus based on a scope of the subject developed in accordance with any appropriate professional body;
- a supply of all essential study materials to minimise the need for frequent visits to medical libraries;
- using a variety of educational methods for teaching and learning;
- support for the learner that is locally accessible and not time-consuming;
- realistic in terms of the academic demands made on the learner;
- incorporating methods of assessment that are relevant to the course objectives deliverable with limited resources. (Davies et al., 2005)

These points highlight the importance of taking into consideration a number of elements in the design and delivery of DL training programmes for health workers. Clarity over the academic and logistical background of the audience, together with the needs and requirements of the learners, is central to effective programme design. Engagement with and support from national or local health authorities and the various clinical and non-clinical institutions involved in the delivery of health services is central to effective programme delivery. Finally, while the evidence is not conclusive, indications are that, ideally, as part of the basic criteria identified for programme success, instructional design in DL for health workers should include a range of teaching and learning components delivered through mixed media, face-to-face components and a variety of learner support mechanisms (Perraton, 2010).

This range of elements raises a number of implications for individual programmes, particularly in light of the availability of appropriate institutional budget, infrastructure, support networks and available facilities.

Firstly, in selecting the precise range and combination of teaching and learning components to be applied for health worker training, DL providers need to take five major factors into consideration.

1. The less learner support provided by a programme, whether by face-to-face contact or through distance mechanisms, the greater the likely number of non-completers and dropouts.
2. The more face-to-face components included, the more expensive the programme to the provider and the greater restriction on enrolment numbers.
3. The more practical learning and supervision required by the course, the more face-to-face contact or interactive media necessary.
4. The greater the combination of media and learning materials used, the greater the opportunity to meet individual learning needs among students.
5. The greater the number of teaching and learning components used (learning materials, media, distance or face-to-face contact, assessment etc.), the more complex and specialised the administrative and management structures required. These should be considered as specialised and context-relevant as the systems for teaching and learning (Perraton, 2010).

Secondly, provider institutions need to engage fully with the process of gathering information related to the precise contextual needs of the learners and the health environments which the programmes are designed to address. Further to this, there is a need for provider institutions and their partners to engage fully with the process of programme evaluation, in order to contribute to much needed evidence of impact that will assist in further determining modes of best practice in programme design and delivery according to a range of contextual criteria.

Thirdly, through formalised institutional arrangements, programmes need to seek integration with existing health systems and health training mechanisms, in order that they:

- operate with support from existing health systems and structures – teaching hospitals; local health authorities; health strategies and policies (Perraton, 2010);

- engage with other sector-wide inputs related to health systems strengthening and health worker performance;
- form part of a continuum of training alongside other programmes.

In this regard, it should be noted that insufficient coordination with and between state bodies such as ministries of education and health can be a barrier to the provider institutes' ability to effectively deliver programmes and increase the capacity of the health workforce (Mullan et al., 2010a).

Fourthly, provider institutes should also consider the benefits of forming inter-institutional partnerships, both nationally, regionally or internationally. Many medical schools have developed partnerships with other medical schools, universities, and funding organisations. These partnerships support not just programme delivery, but also teaching, service and research activities, and programme development. For example, Makerere University holds multiple foreign academic and non-profit linkages, providing extensive research capability, teaching at the postgraduate level, and support to learners in their work at community sites through funds for transportation or accommodation (Mullan et al., 2010b).

Section 10: Future recommendations

10.1. Introduction

This section identifies a number of future tasks and activities that would contribute to improving evidence of the value of DL for health workers in LMICs. In addition, this section also identifies a number of further outputs that would assist practitioners and provider institutions in the future design and delivery of DL for health workers.

10.2. Areas of research

As described in Section 1, this review focused on accredited post-qualification DL for health workers in LMICs, and out of necessity has only provided a partial overview of current activities in this field. With this in mind, there are some further research activities that would assist in gathering a fuller picture of DL for health workers in LMICs, whether post-qualification, pre-service or non-professional. These include:

- an audit of DL4H activities at the global level, including pre-service, post-qualification, Continuing Professional Development and non-formal initiatives for adult education and untrained health workers;

- an investigation of current practice in the use of distance-based methodologies, media and technologies for the strengthening of health systems and services in LMICs, including: gathering and sharing of information; HR management; coordination of isolated clinical staff and clinic activities; management of supply and procurement; distribution of medicines, vaccines and knowledge resources;

Secondly, while there are examples of current practice indentified by this review that give a generalised picture of DL4H design and delivery, there are a number of further research activities that would assist in enhancing these findings further. These include:

- a detailed analysis of the theoretical and pedagogic models that underpin teaching and learning approaches in current DL programmes for post-qualification health workers;

- a detailed analysis of instructional design approaches in current DL programmes for post-qualification health workers;

- a detailed analysis of programme design and delivery models in current DL programmes for post-qualification health workers in LMICs, including teaching and learning components, mechanisms for learner support, modes of assessment, and media and technology usage within these;

- an analysis of learner experiences in DL4H at the international level, including the identification and analysis of various logistical, cultural and academic factors and their influence on the learning process.

10.3. Further outputs

There are a number of further outputs that this review might seek to develop as a means of assisting practitioners in the research, design and development, and delivery of DL for health workers.

These include:

- a series of guidelines determining suitable indicators for evidence of impact of DL for health workers related to:
    - health worker performance
    - health systems strengthening
    - wider health outcomes;

- a framework and guidelines for the evaluation of DL programmes for health workers, designed for use by provider institutions, DL practitioners, and the health sector;

- guidelines and criteria for the selection of programme design models in DL for health workers, including teaching and learning components, learner support mechanisms, and health sector partnerships;

- guidelines and criteria for the selection of appropriate media and technology for use in DL for health workers in LMICs, including such factors as accessibility, reliability, ease-of-use, logistical infrastructure, and cost to providers and users.

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Section 7: A summary of current practice in distance learning for health workers

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Section 8: Evaluating the evidence of impact of DL4H on health worker performance and wider health outcomes

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